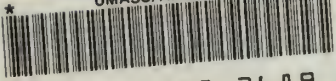


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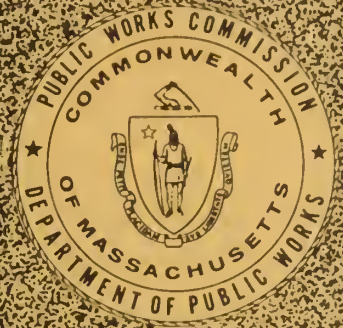








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July 1, 1970 - June 30, 1971



# annual report

MASSACHUSETTS  
DEPARTMENT  
OF PUBLIC WORKS

Government Documents  
Collection  
DEC 27 1971  
University of Massachusetts

**BRUCE CAMPBELL**  
COMMISSIONER

**ROBERT S. FOSTER**

**PETER E. DONADIO**

**JOHN P. KING**

ASSOCIATE COMMISSIONERS

◀ **PUBLIC WORKS COMMISSION**







# *The Commonwealth of Massachusetts*

*Department of Public Works*

*Office of the Commissioner*

*100 Nashua Street, Boston 02114*

December 1, 1971

His Excellency, Governor Francis W. Sargent  
and the Great and General Court of the  
Commonwealth of Massachusetts:

Gentlemen:

In accordance with Section 5 of Chapter 16,  
as amended by Chapter 821 of the Acts of 1963, I  
herewith submit the annual report of the  
Massachusetts Department of Public Works for the  
fiscal year ending June 30, 1971.

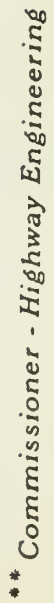
Very truly yours,

A handwritten signature in cursive script that reads "Bruce Campbell".

BRUCE CAMPBELL  
COMMISSIONER



# ORGANIZATION CHART







## INDEX

- - - - -

- A. Division of Administrative Services
- B. Highway Engineering
  - 1. Highway Design Division
  - 2. Right of Way Bureau
  - 3. Bridge Section
  - 4. Traffic Engineering Section
  - 5. State Aid Section
  - 6. Research and Materials Section
- C. Highway Construction
  - 1. Construction Section
  - 2. Contract Engineer Section
  - 3. Final Review Section
  - 4. Procedures and Records Section
- D. Highway Maintenance Section
  - 1. Maintenance Section
- E. Division of Waterways
  - 1. Division of Waterways
- F. Bureau of Transportation Planning and Development
- G. Bureau of Solid Waste Disposal
- H. Legislation



**A**





## DIVISION OF ADMINISTRATIVE SERVICES

The major functional activities of the Division of Administrative Services (approximately 324 employees) are as follows:

1. Processing, reviewing, recording and reporting all financial transactions of the Department.
2. Processing and recording of all personnel actions.
3. Coordinating the preparation and administration of the Department budget.
4. General Services (Print Shop, Blue Print Shop, Micro-filming, Photography, Xeroxing, Mail Room and other general services to the Department.
5. Establishing and revising administrative procedures and systems.
6. Accident prevention and safety programs.
7. General secretarial activities for the Department.
8. Supervision of:
  - a. Public Works Building Security.
  - b. Public Works Building Operation and Maintenance
  - c. Motor Pool Activities.

Appendix A presents organization chart and statement of responsibility for the Division and the sections thereof.

During Fiscal 1971, the Division continued its long-range effort to strengthen and streamline all functional operations, particularly in the general administrative and financial management areas.



APPENDIX A

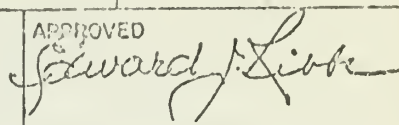
Organization Chart

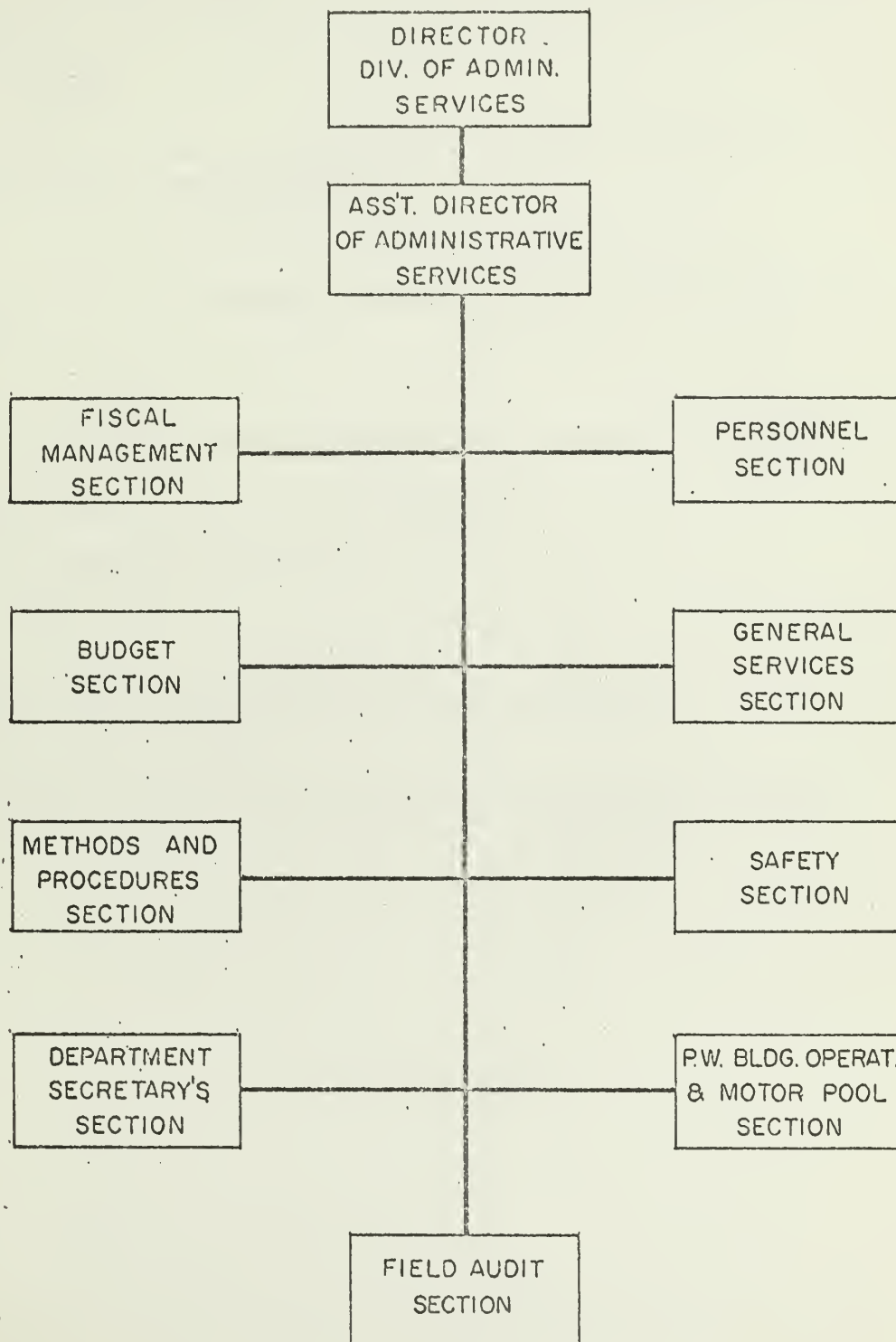
Statement of Responsibility

DIVISION OF ADMINISTRATIVE SERVICES





COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS <b>STANDARD OPERATING PROCEDURES</b>			S.O.P. No. ADM-01-35-1-000		
SUBJECT: DIVISION OF ADMINISTRATIVE SERVICES-ORGANIZATION CHART				PAGE 1 OF 1 DISTRIBUTION A	
EFFECTIVE	ISSUED	SUPERSEDES	PAGE 1	OF 1	APPROVED
March 15, 1969	March 15, 1969	S.O.P. No. ADM-01-35-1-000 EFFECTIVE July 1, 1967			





COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS STANDARD OPERATING PROCEDURES			S.O.P. No. ADM-01-36-1-000	
			PAGE 1 OF 1	
SUBJECT DIVISION OF ADMINISTRATIVE SERVICES- STATEMENT OF RESPONSIBILITIES			DISTRIBUTION A	
EFFECTIVE	ISSUED	SUPERSEDES	PAGE 1 OF 1	APPROVED
March 15, 1969	March 15, 1969	S.O.P. No. ADM-01-36-1-000 EFFECTIVE July 1, 1967		<i>Edward J. Lobe</i>

SUMMARY STATEMENT OF RESPONSIBILITIES

Responsible for the administrative and financial activities of the Department.

MAJOR ACTIVITIES

1. Processing, reviewing, recording and reporting all financial transactions of the Department.
2. Processing and recording all personnel actions.
3. Coordinating the preparation and administration of the Department budget.
4. General Services.
5. Establishing and revising administrative procedures and systems.
6. Accident prevention and safety programs.
7. General secretarial activities.
8. Supervision of:
  - a. Public Works Building Security
  - b. Public Works Building Operation and Maintenance
  - c. Motor Pool Activities.
9. Auditing of utility company, railroad and consultant contract billings to ascertain their correctness and propriety.



**B**



HIGHWAY DESIGN DIVISION

SURVEYS, PLANS, ESTIMATES & FINAL SURVEYS

During the fiscal year ending June 30, 1971, preliminary surveys, plans, estimates and final surveys were made as follows:

FOR STATE HIGHWAY CONSTRUCTION

	<u>Cities</u>	<u>Towns</u>	<u>Miles</u>
Preliminary Surveys	9	33	83.7
" Plans	2	26	34.4
" Estimates	5	21	19.1
Final Surveys	6	15	39.1

FOR STATE HIGHWAY RECONSTRUCTION

Preliminary Surveys	9	34	65.0
" Plans	13	26	23.7
" Estimates	13	18	31.4
Final Surveys	5	3	4.1

FOR CHAPTER 81

Preliminary Surveys	0	0	0
" Plans	0	0	0
" Estimates	0	172	9282.0
Final Surveys	0	0	0

FOR CHAPTER 90  
(Advertised & Unit Price)

Preliminary Surveys	15	39	46.5
" Plans	12	26	29.2
" Estimates	16	27	31.0
Final Surveys	8	16	19.9





HIGHWAY DESIGN DIVISION  
FOR CHAPTER 90 CONSTRUCTION

(Force Account)

Preliminary Surveys	6	115	87.8
" Plans	3	102	67.4
" Estimates	6	179	183.5
Final Surveys	0	0	0

FOR CHAPTER 90 (MAINTENANCE)

Preliminary Surveys	3	12	3.3
" Plans	0	0	0
" Estimates	1	213	951.3
Final Surveys	0	0	0

FOR ROADSIDE DEVELOPMENT

Preliminary Surveys	0	1	0.7
" Plans	0	1	0.3
" Estimates	2	6	18.3
Final Surveys	0	0	0

FOR ACCIDENT PRONE

Preliminary Surveys	4	12	8.3
" Plans	9	26	25.5
" Estimates	18	58	48.2
Final Surveys	1	1	1.0

FOR RECONSTRUCTION SUB-STANDARD BRIDGES

Preliminary Surveys	3	14	7.6
" Plans	1	9	2.5
" Estimates	3	23	4.5
Final Surveys	0	0	0



HIGHWAY DESIGN DIVISION

NOTE:

No Landscape & Scenic Enhancement Projects

No Control of Junk Yards Project



HIGHWAY DESIGN DIVISION

\*

<u>PROJECTS ADVERTISED</u>	<u>ESTIMATED COST</u>
Pittsfield - Downtown Streets	\$ 500,000.00
Watertown - Watertown Square	450,000.00
Worcester - Park Avenue	500,000.00
Fall River - Plymouth Avenue	100,000.00
Boston - Six Isolated Intersections	100,000.00
Boston - Financial District	400,000.00
Boston and Brookline - Mountfort St.	<u>50,000.00</u>
Total	\$ 2,100,000.00

70 Tentative Type (II) Networks prepared.

31 Proposed area-wide Topic Plans submitted.

45 Project eligibility statements submitted

30 Individual type (II) Route additions submitted.

40 Project reports prepared.

9 Design PS and E's completed.

7 Design preliminary (75% stage) plans submitted.





HIGHWAY DESIGN DIVISION

GEODETTIC SURVEYS

Field Work

Triangulation	65 Sq. Miles
Triangulation Reconnaissance	100 Sq. Miles
Second Order Traverses	104 Sq. Miles
Level Lines	70 Miles
Geodetic Monuments Recovered	250
New Geodetic Monuments Established	150
Geodimeter Measurements for Districts	675 Miles

OFFICE COMPUTATIONS

Triangulation Nets Computed and Plotting	65 Sq. Miles
Second Order Traverses Computed and Plotted	70 Miles
Baseline Traverses Computed	120 Miles
Level Lines Computed	40 Miles
File Cards Re-Typed and Drafted	1600
Adjusted Highway Traverses Computed	40 Miles

MISCELLANEOUS

Drafting Plans of Geodetic Traverses  
 Plotting Control Points on U.S.G.S. Quad Sheets  
 Review and Advise on Town Line Changes  
 Issue Control Data to Private and Governmental Agencies

AERIAL SURVEYS

Reconnaissance Scale: 1"=200"

University of Massachusetts Medical School	
- Worcester	8.00 Sq. Miles
Route 10 Southampton - Easthampton	<u>4.24 Sq. Miles</u>
	12.24 Sq. Miles



HIGHWAY DESIGN DIVISION

AERIAL SURVEYS

Preliminary Plans Scale: 1"=40'

Route 52 West Boylston to Leominster	18.05 Miles
Route 2 Greenfield to Gill	4.44 Miles
Route 33 Chicopee	<u>4.93 Miles</u>
	27.42 Miles

Area Wide Photography Scale: 1"=600'

LENGTHS OF STATE HIGHWAY LAID OUT FROM

JULY 1, 1970 to JUNE 30, 1971

16,474 additional miles of State Highway were laid out in 4 Cities and 10 Towns.

1 State Highway layout in 1 City involving no mileage.

45 State highway alterations not involving additional mileage were made in 11 Cities and 27 Towns.

No State highway alterations involving additional mileage were laid out.

6 Sections of State highway were discontinued in 6 Towns for a total of 5.151 miles.

No City layouts were prepared.

2 Town layouts in 2 towns were prepared.

90 Advance Order of takings in 15 cities and 7 towns were prepared for proposed State highway locations, 6 being taken in the City of Boston.

No Sections of State highway were abandoned.

No Recreation Areas were taken.

2 Maintenance areas were taken in 1 city and 1 town



HIGHWAY DESIGN DIVISION

LENGTHS OF STATE HIGHWAY LAID OUT FROM

JULY 1, 1970 to JUNE 30, 1971

An area of land was conveyed to the City of Worcester,  
for street purposes.

2 Conveyances to private owners.

2 bridges taken in accordance with Chapter 482 of the Acts of  
1948, altered and laid out as State highways in 1 City and 1 Town.

3 Bridges taken in accordance with Chapter 690 of the Acts of  
1945, altered and laid out as State highways in 3 Towns.

The total length of State highway location on June 30, 1971,  
was 2658.566 miles.





### RIGHT OF WAY BUREAU

Right of Way activities for Fiscal Year 1971, although diminished to some degree by the Highway Moratorium within the area of Route 128, still proved to be a very extensive operation.

With the passage of the 1970 Federal Highway Act, effective January 1, 1971, which greatly increases the relocation benefits to displaced individuals, families and businesses, an even greater work load has been added to the staff of the Right of Way Bureau.

As a direct result of the Highway projects for Fiscal Year 1971, it was necessary to obtain Title Examinations on 860 properties. It was further required that 577 Title Rundowns be made on properties involved in Land Takings.

During 1971 Fiscal Year, 358 Staff Appraisals were prepared and 152 Fee Appraisals secured. The Appraisal Review Section reviewed a total of 553 appraisals, both fee and staff. In addition, the Review Section reviewed 2 cases for the Youth Service Board and 2 cases for the Boston Redevelopment Authority.

The Massachusetts Real Estate Review Board took action on 76 cases.

16.474 additional miles of State highway were laid out in four cities and ten towns during Fiscal Year 1971. One State highway layout in one city involved no mileage. Forty-five State highway alterations not involving additional mileage were made in eleven cities and twenty-seven towns. Six sections of



RIGHT OF WAY BUREAU

State highway were discontinued in six towns for a total of 5.151 miles. Two town layouts in two towns were prepared. Ninety advance Order of Takings in fifteen cities and seven towns were prepared for proposed State highway locations, six being taken in the city of Boston. Two Maintenance Areas were taken in one city and one town. An area of land was conveyed to the city of Worcester for street purposes. Two conveyances to private owners. Two bridges taken in accordance with Chapter 482 of the Acts of 1948, altered and laid out as State highways in one city and one town. Three bridges taken in accordance with Chapter 690 of the Acts of 1945, altered and laid out as State highways in three towns. The total length of State highway location on June 30, 1971 was 2658.566 miles.

Over all, 917 parcels of land were acquired for highway purposes during Fiscal Year 1971 at a total cost of \$8,272,380. In addition, the Attorney General's office settled 234 cases for an additional \$6,013,418, bringing the total land acquisition cost for the Fiscal Year to \$14,285,798.

Attorney General's settlements, which were 30% above Department figures, continue to reflect a far better level of accomplishment than that which prevails nationally.

The Negotiation Section made offers in 547 cases. Negotiators also rendered assistance to the Land Damage Payment



## RIGHT OF WAY BUREAU

Section which processed 560 payments to property owners during the Fiscal Year. In 139 cases a final settlement was obtained with the property owners.

The 1968 Federal Highway Act increased the responsibilities of the Relocation Section of the Right of Way Bureau substantially. However, with enactment of the 1970 Federal Highway Act, the activities of the Relocation Section have expanded to the extent that it is doubtful if the mandate of the Act can be carried out unless extensive increases in personnel are added to the Right of Way Bureau.

During Fiscal Year 1971, land takings affected 190 families and 17 businesses. In this period, 128 families were relocated and 20 businesses moved to new quarters.

Two hundred and twenty-five moving cost claims, both residential and business were processed during the Fiscal Year, involving a total amount of \$557,284. One hundred eighty-nine replacement housing allowance claims totalling \$638,066.

(Average \$3,760) Three hundred ninety rent supplement claims totalling \$458,512. (Average \$1,176) One hundred seventy-nine dislocation allowance claims totalling \$17,900.

(Average \$100) Business discontinuance claims for five businesses totalling \$21,361 (Average \$4,272) were processed during Fiscal Year 1971. A total of 988 business and residential relocation claims were processed in Fiscal Year 1971 and the total relocation cost was \$1,905,611.



## RIGHT OF WAY BUREAU

Relocation services rendered by Contract Agents in Boston reflected a fiscal outlay of \$1,522,333.

Property Management activities of the Bureau were extensive during Fiscal Year 1971 as can be seen from the following figures:-

During the year fiscal 1971, rentals under the Property Management Section of the Right of Way Bureau grossed \$178,733.00 with a net income after expenses of \$21,731.14.

Sales of principal structures and improvements yielded \$31,411.60 and sales of land brought \$7,077.00. Parking areas' leases produced \$47,097.61.

Additional leases netted \$209,411.06, bringing the total net receipts to \$317,028.41 for fiscal 1971.

During the year, 203 structures were acquired, of which 171 were residential and 32 were commercial.\*

During the same year, 80 were vacated and 97 structures were released for demolition.\*\*

\*A total decrease of 32.8% over fiscal 1970, with a decrease of 28.8% in residential and a 51.8% decrease in commercial buildings.

\*\*A decrease of 65.0% vacated over fiscal 1970 and a 55.6% decrease for demolition.





RIGHT OF WAY BUREAU

Comparison for fiscal	<u>1970</u>	<u>1971</u>
Grossed rental income	\$194,238.50	\$178,733.00
Net income after expenses	71,350.90	21,731.14
Sales of structures	50,137.00	31,411.60
Sales of land	21,707.50	7,077.00
Parking area leases	51,660.00	47,097.61
Additional leases	<u>231,196.67</u>	<u>209,411.06</u>
Total Net Income	\$426,051.26	\$317,028.41

For the first time the Department instituted a Rental Program where off-site tenants were allowed to rent acquired properties that were vacant in Lynn I-95 for the period of the Highway re-study. It would be too early at this time to evaluate this program.

The activities of the Advance Acquisition Section increased dramatically in Fiscal Year 1971 with requests for hardship takings far exceeding the preceding year.

Sixty-two properties were actually acquired as a result of the work of this section. Fifty-six of those properties acquired were considered hardship cases with the owner requesting advance acquisition. The acquisition costs in these instances exceed \$2,000,000. In the remaining six cases, the advance acquisition was initiated by the Department. These represented cases where private property in a known Highway corridor



RIGHT OF WAY BUREAU

was being developed. The cost of this acquisition was \$775,000. Failure of the Department to take action in this matter could have resulted in damages in excess of \$4,000,000 if the development had been allowed to be completed.

During Fiscal Year 1971 the Bureau's Federal Highway Administration (FHWA) Liaison Section submitted reclaim vouchers under the Audit Deduction Program in the amount of \$245,048. In addition, claims under Meredith and Grew Inc. Contract 9107 in the amount of \$4,228,298 were resolved. Ineligibility findings by Public Roads in the amount of \$564,963 were resolved in favor of the Commonwealth. Many meetings were held with the FHWA throughout the year in connection with resolving outstanding Federal reimbursement on the Meredith & Grew Inc. Contract No. 9107, and the inspections in depth that are periodically made by the FHWA. The Uniform Relocation Assistance and Real Property Acquisition Act of 1970 was the subject of considerable liaison activity as the Act will require substantial compliance by the Department especially in connection with the Department's Relocation Advisory Assistance and Payment program.

In the area of legislation, the Right of Way Bureau was extremely active during Fiscal Year 1971. Of the legislation filed by the Department at the suggestion of the Right of Way Bureau, four Bills are to be noted. Three Bills were enacted:



### RIGHT OF WAY BUREAU

Chapter 597, which authorizes the Department to acquire land adjacent to the present Department motor pool on Mashua Street for the purpose of storing and parking vehicles; Chapter 633, which authorizes the Department to acquire land for public parks, recreation areas, wildlife preserves and historic sites to replace similar lands which were required for use in Federal highway programs; Chapter 818 which authorizes the application of administrative discretion so that land damage payments may be made in cases under \$500 whenever such payments are held up due to deficiencies of title and it would be impossible or financially prohibitive to clear up such deficiencies. One Bill, House 279, was referred to the Judicial Council of Massachusetts for its opinion. House Bill 279 would provide for uniform relocation assistance and benefits whenever property is acquired by eminent domain whether or not such program is Federally assisted. The Department submitted a revised version of House Bill 279 to the Judicial Council and their opinion on this matter is hopefully anticipated.

The Department also filed 16 Bills which would authorize the taking of certain public lands for their diversion to highway use. The Right of Way Bureau answered to the Legislature and the Governor on 15 of those Bills. The need of such legislation was made obvious by recent court decisions.

During Fiscal Year 1971 the Right of Way Bureau's training



RIGHT OF WAY BUREAU

program for its employees continued to operate in a smooth and efficient manner during fiscal 1971. Eighty-nine employees participated in the following educational programs during the year:-

(1) Forty-six attended the New England Law Institute Seminar on Continuing Education on Eminent Domain Law on November 7, 1970.

(2) Thirty-one attended MAI Course 2, in Appraising, held at Bentley College in Waltham, Massachusetts, April 20 - May 25th, 1971.

(3) Twelve new employees were directed through the eight week in-service training program.

Holding to the one cardinal principle that the training program should be of a continuing variety so as to ensure a continuing high level of efficient operation and to provide for needed changes and improvements brought about by new Federal and State laws and regulations, steps were taken to solicit the cooperation of Colleges and Universities within the Commonwealth in training a number of our Right of Way people. The goal was to have a Right of Way Institute established within a College or University, which would focus completely upon our Right of Way needs. After months of negotiations, the President and Trustees of Suffolk University responded favorably to our solicitations, and on June 25, 1971 agreed to sponsor "The Right of Way Institute" within their





RIGHT OF WAY BUREAU

University, which is located in Boston, Massachusetts. This Institute will not only focus completely upon Right of Way needs but will grant professional designations to its graduates, thereby enhancing their qualifications when testifying as "Experts" for the Department before the Courts of the Commonwealth. Classes were scheduled to commence on Wednesday, September 22, 1971, and extending into the middle of May, 1972.



## BRIDGE SECTION

During the period from July 1, 1970 to June 30, 1971, the Department advertised for bids for constructing thirty-five (35) bridges and culverts. These structures were either designed by or processed through the Department's Bridge Section.

These structures were located in twenty-eight cities and towns throughout the Commonwealth and cost approximately \$8,400,000.

Twelve of these structures were for Route 6, twelve were for the replacement of sub-standard bridges and the remainder were for various State Highway and Chapter 90 projects.

Twenty-three (23) boring contracts were advertised during this period at a cost of approximately \$700,000.

The Department has made preliminary studies and has initiated work on bridges at the following locations:

Athol-Orange-Wendell - Route 2

Peabody-Salem-Swampscott - Beverly Connector

Framingham-Natick - Route 9

Attleboro - I-895

Chicopee - I-391

Fall River - Western Expressway

Berlin-Bolton-Marlborough - Route 85

Lanesborough-Lenox-Pittsfield - Route 7

Newburyport - I-95

Monterey - Route 23

Wareham - Route 25

Athol-Phillipston - Route 2



## BRIDGE SECTION

The Department has contracted with two testing laboratories to supply structural steel fabrication inspectors and non-destructive testing technicians. The inspections and tests are conducted under the supervision of the Metals Control Unit of this Section. During this fiscal year a portion of the inspection service was utilized in completion of twenty thousand tons of structural components fabricated from steel which is to be left in the unpainted condition. Inspection of base material and weldments was performed using both through wave and shear wave ultra sound techniques. Radiographic inspection was performed with X-ray and isotope sources. Monitoring has resulted in increased efficiency which has reduced fabrication costs and a corresponding saving to the Commonwealth.

In addition to the regular bridge designs completed during the above period, the Department continues to receive numerous request from Utility Companies to place utilities on existing structures. Requests are also received for permits to move overweight loads over bridges on public ways. In every case all bridges on public ways must be analyzed to insure that the safety of the traveling public is not jeopardized by permits issued by the Department.

Requests are received from our maintenance forces to investigate and develop repair procedures from bridges damaged by trucks impacting the superstructures and bridges damaged by fire.



### BRIDGE SECTION

Included in the requests are bridges which must be analyzed to determine what effect the resurfacing of the deck with bituminous concrete will have in overstressing the structure.

To comply with the provisions of Chapter 85, Section 35 of the General Laws, the Department has reviewed the designs of bridges on public ways submitted by various municipalities, and supplied advice, as authorized by Chapter 81 of the General Laws relating to public ways, to the Cities and Towns. Under this authorization, the Department has inspected structures and made recommendations concerning their safety or suggested repair procedures.

During the above period, the Department entered and won an award in the national bridge contest sponsored by the American Institute of Steel Construction. An award of merit was received for the Shrewsbury-Worcester bridge carrying Interstate Route 290 over Lake Quinsigamond. The award was issued for a structure in the medium span; low clearance category.

The Department undertook a program to train personnel in the field to inspect bridges in order to comply with the Federal Highway Administrations requirements for bridge inspections. This Section was instrumental in supplying personnel to act as instructors for this program.





## TRAFFIC ENGINEERING SECTION

During fiscal 1971 the Traffic Engineering Section experienced an increase in its general operations as expressed in the following unit activity reports:

### TRAFFIC OPERATIONS & SAFETY UNIT

#### TRAFFIC RECORDS PROJECT

The Department's Data Processing Accident Records System was further developed and refined during the last fiscal year. Currently the system has the capability to generate, within 24 hours, accident data to the various Department Divisions and Districts.

The system is one of the most sophisticated Accident Records systems in the country. The Department has established the base to develop the system to the ultimate in information retrieval allowable by the current state of the art. The Traffic Engineering Section has maintained continuous liaison with the source data agency, the Registry of Motor Vehicles. This liaison is maintained through the assignment of a member of the Department to assist Registry personnel in locating those accidents which occur on the State Highway System.

Numerous data processing programs have been developed through the cooperative effort of the Traffic Engineering Section and the Department's Data Processing Center. These programs have proven to be of invaluable assistance to Department engineers in all phases of design and analysis of both existing and new highway locations.

#### TRAFFIC ENGINEERING - ACCIDENT UNIT

The Department's Traffic Engineering Accident Unit has expanded



TRAFFIC ENGINEERING SECTION

TRAFFIC ENGINEERING - ACCIDENT UNIT (Cont'd)

both in personnel and its share of responsibility. This particular unit is responsible for the continual development and maintenance of the Department's Traffic Records System. As in the past, a large effort of the unit has been devoted to the coordination of investigation of all fatal accidents occurring on the State Highway System. Under investigation during this year has been the further refinement of engineering investigation techniques of fatal accidents. Each fatal accident occurring on the State Highway System receives special and particular attention through in-depth investigation by District Traffic Engineering Personnel. The investigations are geared toward particular emphasis on roadway characteristics and their possible cause and effect as related to the accident.

During this period of time, the Department published its fifth Annual Report of "State Highway Fatal Motor Vehicle Accidents". The publication is a compilation and presentation of statistical data relative to fatal accidents which have occurred on the State Highway System. The information was compiled, assembled and published by the Traffic Engineering Section.

Further studies were made to evaluate the Department's Spot Improvement Project. "Before" and "After" accident studies, coupled with economic studies, were made of several improved locations, throughout the State. The studies show conclusively that benefits derived from the Safety Improvements far outweigh the expenditures made.



## TRAFFIC ENGINEERING SECTION

### TRAFFIC ENGINEERING - ACCIDENT UNIT (Cont'd)

A special speed study was undertaken on Route 128 in Woburn. Through the cooperative efforts of the Registry of Motor Vehicles and State Police, it was demonstrated that the accident rate on this section of highway was reduced by 50 percent over a 9-month period.

### B. U. LAW - MEDICINE RESEARCH PROJECT

The Traffic Engineering Section continued its participation in the Boston University Research Project. The goals of the project are to study in-depth fatal car crashes in the Boston Metropolitan area.

This Section provided the engineering expertise for the multi-disciplinary investigative team. Investigations include careful analysis of basic elements of a collision and recommendations to further reduce crashes and injuries of a similar nature. The Traffic Engineering - Traffic Highway Engineer Disciplines - represents one of 7 disciplines in the multi-disciplinary accident investigative team. The team is one of eight throughout the country and is funded through a Federal Aid-DOT-Grant.

### EXCLUSIVE BUS LANE - SOUTHEAST EXPRESSWAY

In February, 1970, the Traffic Engineering Section began evaluation studies to determine methods of improving the Southeast Expressway corridor during peak operating hours. The study indicated that an exclusive bus lane on the Southeast Expressway might provide a partial solution.





## TRAFFIC ENGINEERING SECTION

### EXCLUSIVE BUS LANE - SOUTHEAST EXPRESSWAY (Cont'd)

In May, 1971, after extensive planning, testing, cooperation and coordination between this Department, the Metropolitan District Commission, the Department of Public Safety, the Department of Public Utilities and the private carriers servicing the Southeast portion of the State, an exclusive bus lane was put into operation. Preliminary evaluations of this demonstration project and its effect during peak hours have proven that there has been a definite measure of success. More important, this demonstration illustrates that a balanced type transportation system can be effected by the Highway Engineer working in concert with various agencies and differing modes of transportation.

### CHAPTER 519

Acting under the provisions of Chapter 519, Acts of 1967, the Department continued to administer the program which resulted in the installation of traffic control devices and reconstruction of intersections throughout the State. Established procedures were used to define and identify high accident locations under the jurisdiction of cities and towns.

Through June of 1971, \$940,000 in State funds of an original \$1 million allocation were distributed among 46 communities in the State. In addition, approximately \$1.1 million in Chapter 519 project requests were transferred to the TOPICS Program and constructed as early start TOPICS projects.





## TRAFFIC ENGINEERING SECTION

### CHAPTER 519(Cont'd)

Legislation was filed to continue this program for the coming fiscal year. However, this request was denied by the Legislature marking the official termination of this safety program on July 1, 1971.

### CHAPTER 616

Under provisions of Chapter 616, Section 6, Acts of 1967 and Chapter 85, Section 2 of the General Laws, the Traffic Engineering Section continued to exercise administrative guidance and policy control over District submissions of School Zone projects throughout the Commonwealth.

Chapter 616 School Zoning installations provide valuable aids to protect children when crossing the roadway during school hours. Special signs installed within each School Zone effect a legal speed limit of 20 m.p.h. when flashing. They also provide an additional safety factor when School Buses enter or leave school property.

In Fiscal 1971, forty-six (46) cities and/or towns installed one hundred and one (101) approved School Zones for which approximately \$330,000 was encumbered as reimbursables from the established bond issue funds.

### TOPICS

Within the Traffic Operations & Safety Unit has been established the position of TOPICS Coordinator whose responsibility it is to process through the various units of the Traffic Section all TOPICS proposals forwarded from the Department TOPICS Coordinator - the former serving as a link between the Traffic Section and



## TRAFFIC ENGINEERING SECTION

### TOPICS (Cont'd)

the Department Coordinator; the latter, between the Department of Public Works and the Design Consultants.

The processing procedure entails the in-depth review of TOPICS proposals by each of the Traffic units for compliance with Department standards and specifications for signing, pavement markings, signals, lighting, regulations and geometrics. Comments and recommendations arising from such reviews are assembled in memo form for delivery through the Department Coordinator to the design consultant for incorporation into the final project design.

TOPICS (Traffic Operations Program to Increase Capacity & Safety), established under Section 10 of the Federal Aid Highway Act of 1968 under guide lines as set forth in PPM 21-18 and funded on a 50-50 basis between federal and state monies, is available to any qualifying city or town upon signing a TOPICS agreement with the Commonwealth of Massachusetts to maintain facilities built under this program in accordance with Department standards and regulations. Thereupon, a Type II network is designated and an area-wide plan formulated through a joint effort between the particular city or town, the design consultant and various other authorities.

Since all design consultant contracts and allotments are handled through the Department's TOPICS Coordinator, our progress is herein reported in terms of participation in this program by cities and towns. To date, 82 TOPICS agreements have been signed with the Department with indications that this number will increase significantly and rapidly in the near future.



## TRAFFIC ENGINEERING SECTION

### SPEED CONTROL UNIT

A priority schedule for Speed Control Operations was continued in the fiscal year 1970 - 1971. Comprehensive engineering studies for each highway tested were employed using radar speed meters to measure vehicular speeds, ball bank indicators to test each horizontal curve encountered and trial runs to evaluate the practicality of the maximum safe speed.

Forty-four Special Speed Regulations were approved jointly by the Department and the Registry of Motor Vehicles on State Highways representing a total of 241 miles. Fifty-nine Special Speed Regulations were approved by the Department and the Registry of Motor Vehicles on 209 city and town ways.

Technical traffic engineering advice was given to thirty municipalities to aid them in their preparation to obtain Special Speed Regulations.

### REGULATIONS SECTION

Many municipalities, particularly towns, have existing traffic regulations which have been in effect for a number of years and which have been adequate to provide for their general needs for control. However, the burgeoning TOPICS Program has provided these municipalities with more advanced and sophisticated controls which necessitated considerable revisions of or amendments to their regulations to provide for enforcement of new traffic controls. The proposed project for each municipality was inspected and the controls for which its regulations were deficient were noted. The local governing bodies were then informed and the





## TRAFFIC ENGINEERING SECTION

### REGULATIONS SECTION (Cont'd)

proper regulations were supplied for their adoption.

Many interesting, if sometimes perplexing problems of regulation arose during this period. Examples are the regulations for exclusive bus lane use on an Expressway, a Town's authority to regulate private ways by prescription or dedication, problems in roadside rest areas and an apparent conflict in the laws concerning towing fees. A Bill which might have resolved the towing fee problem was introduced in the Legislature (not by this Department), but failed of passage.

The normal course of regular duties continued apace during this period. Briefly, this consists of conferences with municipal officials and assisting them in drafting traffic regulations, reporting on legislation and appearances before legislative committees and representing the Department in response to court summonses.

### TRAFFIC ENGINEERING TRAINING

During Fiscal 1971 the Traffic Engineering Section was able to expand its continuing efforts in training selected and qualified personnel from Boston and the District Offices.

Four three-week seminars were successfully completed at the Traffic Institute, Northwestern University at Evanston, Illinois by 4 graduate engineers and 6 engineering technicians.

In addition, a successful two-week Short Course in Traffic Engineering for Technicians given by professional instructors





## TRAFFIC ENGINEERING SECTION

### TRAFFIC ENGINEERING TRAINING (Cont'd)

from the Polytechnic Institute of Brooklyn, New York was held in District 4 for 30 engineers from Boston and each District.

The graduate engineering courses provided a comprehensive coverage of Traffic Engineering with emphasis on both urban and rural traffic and highway engineering problems. Through extensive lecture and work problem sessions the participants became acquainted with the latest principles and theories, as well as the problem solving aspects of the traffic engineering science.

The technical courses were directed at improving the skills of the technician in the conduct and supervision of traffic surveys, field investigations, data collection and analysis, and the layout and application of traffic control devices. This should provide stronger technical support for our engineering staff, whereby technicians can perform many of the basic traffic survey, analysis and application techniques with a minimum amount of engineering assistance.

Course materials (books, reference materials) became a portion of the Department's library which in part is shared with the Districts as much as possible.

Selected course participants constitute a cadre of instructors who pass on their acquired knowledge to other personnel of the Department through lectures and discussion at Monthly Traffic Engineering Meetings regularly held at the District 4 Auditorium in Arlington.



TRAFFIC ENGINEERING SECTION

TRAFFIC SIGNS AND PAVEMENT MARKINGS UNIT

I. OPERATIONAL SUMMARY:

1. Signing

- A. Contract -Design and/or review of signing on construction and reconstruction projects awarded under bid contracts.
- B. Force Account - Design and/or review of new or replacement signing totally on an in-house basis.
- C. Experimental Signing
- D. Special Signing

2. Pavement Markings

- A. Contract - Review of markings designed by others on construction and reconstruction projects awarded under bid contracts.
- B. Force Account - Design and detail of projects undertaken wholly by Department forces.

3. Specifications and Standards - Prepared by this unit for signs and markings on all projects.

4. Route Changes and Route Descriptions

5. Miscellaneous

II. SIGNING

During the fiscal year the Unit has handled a volume of work encompassing all projects designed by the Highway Design Section, District Projects Offices and consulting engineers under contract to the Department. The money value of signing on these projects is approximately \$3,500,000.00.



## TRAFFIC ENGINEERING SECTION

### II. SIGNING(Cont'd)

The unit is responsible for designing, signing and/or reviewing designs of others, for directing the motorist to geographic areas serviced by the State Highway System.

Force Account Signing on in-house projects were designed and/or reviewed by this unit on about 250 individual projects throughout the Commonwealth. The money value for these projects would be approximately \$375,000.

Experimental signing this past year was limited to a continuing evaluation of diagrammatic signing on a limited basis. During the year the information was compiled and a report was drafted. It is the intent of this unit to publish and distribute this report on a limited basis.

In the same vein the unit has been involved in several other evaluations most conspicuous of which was the plastic delineator post which has the general appearance of the Department's standard concrete individual post. Although it appears to be a substantial post, it bends when struck and subsequently rebounds to its original position with no damage to the vehicle. These posts were installed by our maintenance force and should be a desirable addition to our Traffic Devices Inventory.

The special signing phase of our operations has been devoted to the development of graphic signing as an aid to the motorist. In addition, to the standard graphics being proposed by the new Federal "Manual on Uniform Traffic Control Devices", this office





## TRAFFIC ENGINEERING SECTION

### II. SIGNING (Cont'd)

has assisted in the development of graphic signing to major traffic generators such as the Boston Aquarium and the Foxboro Stadium.

### III. PAVEMENT MARKINGS

During the fiscal year the Pavement Marking Unit has reviewed the multitude of projects designed by others and have designed a variety of Department projects. The majority of the markings were standard in accordance with the national and state manuals, but a few of the projects required special markings to emphasize the traffic flow through unique geometric designs of at-grade intersections.

Included in the normal program were discussions relating to interpretation of the new Federal Manual which is soon to be distributed. The Unit has attempted to incorporate the standards, that are to be set forth, wherever practical.

In keeping with the national trend, the projects have been designed with thermoplastic markings whenever the traffic volumes warranted their use.

### IV. SPECIFICATIONS AND STANDARDS

In conjunction with the preparation of Department projects either by consultants or in-house forces, this unit prepares and reviews standards and specifications for Traffic Signs and Supports and Pavement Markings. The basic specifications are contained in Section 825 of the Department's Standard Specifications which are





## TRAFFIC ENGINEERING SECTION

### IV. SPECIFICATIONS AND STANDARDS (Cont'd)

constantly being revised, amended and addended to reflect the latest technology developed in the field of Signing & Marking.

Individual projects require special provisions to cover specifics which cannot be included in a general specification. These are written by this office on a project basis as the need arises.

Additionally the Unit is actively involved in the development of new and revised standards for sign supports and breakaway sign posts in order to present prospective bidders and Department designers with comparison data for their individual purposes.

### V. ROUTE CHANGES AND ROUTE DESCRIPTIONS

A secondary function of this unit is to provide and maintain a complete and up-to-date record of Route Descriptions which include route length, description and location of termini, turns, major landmarks and overlaps with other routes.

New construction, relocations, reroutings are included in this constantly changing record for the Department.

Route changes are also handled through this office. During this fiscal year an extensive system of route deletions, relocations and renumbering was initiated.

The Metropolitan Boston area has for years been a maze of overlapping and alternate routes causing some confusion as to which was the better route to a particular location. In order to attain a more orderly and expeditious traffic flow, the preferred routes



## TRAFFIC ENGINEERING SECTION

### V. ROUTE CHANGES AND ROUTE DESCRIPTIONS(Cont'd)

were given primary numbering with other routes relocated or renumbered to eliminate overlaps and indirect routing.

### VI. MISCELLANEOUS

Notwithstanding the normal work load, the Unit has engaged in two major continuing projects.

#### A. Sign and Pavement Marking Inventory

As reported in the previous annual report, a program is being developed in conjunction with other Department Units. A pilot program of physical inventory has been accomplished with the results of the field survey being keypunched and recorded in the computer's memory. It is anticipated that within the next fiscal year the inventory will be available to the Department for whatever purpose desired.

#### B. Mile Marker Program

The contracts for mile and tenth-of-mile markers have been prepared, advertised and awarded. The coming fiscal year should see all of the proposed markers installed for utilization by Department and law enforcement personnel and the general public. During the past fiscal year the Unit processed approximately 500 sign erection reports and 750 sign order forms.

## TRAFFIC SIGNALS, LIGHTING & SOPHISTICATED SYSTEM UNIT

The Traffic Signals, Lighting & Sophisticated System Unit is responsible for the design and technical advancement of Signal,



## TRAFFIC ENGINEERING SECTION

### TRAFFIC SIGNALS, LIGHTING & SOPHISTICATED SYSTEM UNIT (Cont'd)

Highway Illumination and Sophisticated Electronic Highway Systems throughout the Commonwealth.

The Traffic Control Signal segment of the Unit operates in the following areas:

1. Review and approval of traffic signal control designs submitted from consultants and from the District Offices.
2. Issuance of Permits to cities and towns for traffic control signal installations.
3. Review of signal installation designs engineered under the TOPICS Program prior to issuance of the Permit.
4. The Unit has to a limited degree continued with the updating of traffic control signals throughout the State.
5. The Unit is responsible for lending assistance to cities and towns in connection with difficult traffic signal control problems.

The Sophisticated Systems Section of the Unit is responsible for the evaluation and installation of total systems for traffic movement and motorists communications.

The Boston Surveillance and Control System design is progressing into its third year. During the past fiscal year hardware elements, such as conduit, bases and pullboxes, have been integrated with current construction projects in progress on the Central Artery and Route I-93.





## TRAFFIC ENGINEERING SECTION

### MOTORIST AID CALL BOXES

The Unit is making a field evaluation of a very unique motorist's Aid Call Box System which is located on Route I-495 in the Towns of Littleton, Westford and Chelmsford. This particular Motorist's Aid Communication Device needs no outside source of energy, such as wires or batteries. Power is supplied by the person wishing to utilize the device. The stranded motorist wishing to call for help merely grasps the handle of the device, pulls down and depresses 1 of 4 buttons (Service - Police - Fire or Ambulance) which releases an energizing Magneto, sending a signal pulse to a receiver located in the Field Control Tower on Robbins Hill in Chelmsford.

The signal is then transmitted over a leased telephone line to the Concord State Police Barracks. The State Police receive this signal impulse on a console located in their Communications Room and respond by dispatching a cruiser to the vicinity of the signal box. This System is the first of its type in the United States.

### CLOSED CIRCUIT TELEVISION

The Unit has been responsible for the technological guidance and control of a redesign and implementation of the Closed Circuit Television System for the Dewey Tunnel in Boston.

### HIGHWAY ILLUMINATION

The Highway Illumination Segment of the Unit is responsible for the design, design review, the incorporation of the very latest in lighting technologies, and gives technical advice to the





TRAFFIC ENGINEERING SECTION

HIGHWAY ILLUMINATION (Cont'd)

Cities and Towns of the Commonwealth.

The Unit has been working in a continuous review program of Consultant proposals for Design Contracts.

We are continuing to place increasing emphasis upon tower lighting and related technologies.

The Lighting Unit has pioneered tower lighting in this State and has brought increased economy to projects using this type of luminaire standard.

The Traffic Engineering Section's efforts in this area received recognition in the September 1970 Issue of "New England Electrical News" magazine for the successful pilot installation at the Gloucester Route 128 High Tower Lighting Project.

The Unit is currently recommending the use of newly developed high pressure Sodium Lamps in all lighting projects, including tower lighting installations. These lamps are far superior to the mercury-vapor type.



## STATE AID SECTION

The State Aid Section has the responsibility of processing the payment of State Funds to the Cities and Towns in the Commonwealth for the improvement and maintenance of local roads.

### CHAPTER 90

Generally, the State pays one-half the cost of construction and improvement projects with the County and the Municipality each contributing one-fourth. Maintenance assignments are usually divided equally with the State, County and Municipality, each contributing an equal share of one third. The Chapter 90 Tentative Assignments for 1971 total \$16,809,838.00 with the State's share amounting to \$7,999,214.00.



TENTATIVE 1971 CHAPTER 90 ASSIGNMENTSSUMMARY

COUNTY	STATE	TOWN/CITY	COUNTY	TOTAL
BARNSTABLE	\$261,400	\$138,950	\$138,950	\$ 539,300
BERKSHIRE	494,400	307,125	307,875	1,109,400
BRISTOL	611,800	330,050	330,050	1,271,900
DUKES	44,000	25,000	25,000	94,000
ESSEX	730,500	377,400	361,200	1,469,100
FRANKLIN	366,500	227,050	227,050	820,600
HAMPDEN	629,650	363,100	363,100	1,355,850
HAMPSHIRE	333,500	196,700	196,700	726,900
MIDDLESEX	1,476,200	772,650	780,050	3,028,900
NANTUCKET	28,990	28,990	-	57,980
NORFOLK	633,124	350,112	350,112	1,333,348
PLYMOUTH	530,200	280,100	283,100	1,093,400
SUFFOLK	618,100	618,100	-	1,236,200
WORCESTER	1,240,850	730,550	730,550	2,701,950
<u>TOTALS</u>	\$7,999,214	\$4,716,887	\$4,093,737	\$16,809,838



STATE AID SECTION

CHAPTER 81

Section 26 Chapter 81 of the General Laws provides for the expenditure of funds for the repair and improvement of public ways other than State Highways, in the 182 Towns eligible for Chapter 81 participation. The work consists of patching, widening, reshaping, as well as, surface treatment with bituminous materials.

The Chapter 81 program for the year 1971 amounts to \$3,571,710.00 with the State's share as \$2,740,375.00.





# CHAPTER 81 - SECTIONS 26-29 - GENERAL LAWS AS AMENDED

TOWNS UNDER \$5,000,000 VALUATION - LESS THAN 12.00 ROAD MILEAGE RATIO  
VALUATION FROM CHAPTER 559-ACTS OF 1945

County	No. Towns	Miles	-1.40	-2.00	-2.80	-3.50	-5.50	-7.00	-9.00	-12.00
Barnstable	7	398	-	-	-	-	1	5	1	-
Berkshire	23	1005	5	2	4	5	5	1	-	1
Bristol	7	459	-	-	-	-	3	2	-	2
Dukes	3	36	-	-	-	-	1	-	2	-
Essex	10	412	-	-	1	-	-	2	3	4
Franklin	23	1169	6	1	3	3	4	1	3	2
Hampden	12	674	1	2	3	1	3	1	1	-
Hampshire	15	769	3	3	2	2	2	1	1	1
Middlesex	24	1540	-	1	1	1	5	3	8	5
Norfolk	6	302	-	-	-	-	1	1	2	2
Plymouth	8	394	-	-	-	-	3	3	1	1
Worcester	44	2807	1	4	1	3	14	8	8	5
	182	9965	16	13	15	15	42	28	30	23

Towns	Road Mileage Ratio	Miles	Rate Per Mile	Towns Pay	State Pays
16	-1.40	786	15.00	11790.	216150.
13	-2.00	589	25.00	14725.	161975.
15	-2.80	818	40.00	32720.	224950.
15	-3.50	897	50.00	44850.	246675.
42	-5.50	2396	75.00	179700.	658900.
28	-7.00	1626	100.00	162600.	447150.
30	-9.00	1720	125.00	215000.	473000.
23	-12.00	1133	150.00	169950.	311575.
182		9965		831335.	2740375.



## RESEARCH AND MATERIALS SECTION

The Research and Materials Section continued its primary functions, i. e. documentation of the acceptance of materials for Department projects by laboratory testing, certification and inspection; research and soils engineering.

The Section was also active in the current effort to update the Standard Specification and to cooperate with the Design, Research Review and other committees. Personnel from the Section attended technical committee meetings during the year held by American Association of State Highway Officials, American Society of Testing Materials, Highway Research Board as well as many meetings with the Federal Highway Works Administration.

A more detailed report is as follows.

### LABORATORY

The four testing units which comprise the laboratory of the Research and Materials Section continued their assigned responsibilities of advising the Department as to the most desirable specifications for the quality control of materials and the determination by test, whether the materials proposed for Department use are acceptable. Thus, the Department is cognizant of the nature of the materials which are incorporated in its highway projects.

As in the past years, the lack of sufficient work and storage space continues to be a hindrance due to the increased testing demands and the acquisition of additional necessary equipment. During the past year, the laboratory units were



## RESEARCH AND MATERIALS SECTION

inspected by such national organizations as the AASHO Materials Reference Laboratory and the Cement Concrete Reference Laboratory to insure that all equipment and test procedures conform with the established standards. The following is a summary of the activities of each test unit which comprise the Laboratory.

### BITUMINOUS UNIT

This unit has been primarily concerned with research investigations and the quality control testing of all bituminous materials, mixes, pavements and other related materials used in the Department's construction and maintenance projects. During the past year, this unit has also been compiling the test data for the development of the new specification change to the viscosity grading of asphalt cements. In addition to the routine testing, this unit has prepared over 500 sets of Marshall Specimens which are used to determine the optimum density and asphalt content for the bituminous concrete mixes produced by the approximate sixty hot mix plants which supply State projects. An additional 200 specimens were also prepared and analyzed in cooperation with the Department's research program with M.I.T. A major piece of new equipment received this year was a constant temperature refrigerated ductility machine. This enables the Laboratory to obtain information on the performance and behavior of asphalt cements at low temperatures. The total number of



## RESEARCH AND MATERIALS SECTION

samples tested by this unit during the past fiscal year exceeded 2700.

### CONCRETE UNIT

The concrete unit has been responsible for the quality control testing of concrete and other related materials such as cements, aggregate, bricks, blocks, metals, pipes and coatings. During the past year, this unit has received an important piece of new equipment - a Freeze Thaw machine - which enables the unit to perform accelerated weathering tests on concrete and related products. The number of samples received for determination of the quality of the galvanized coating has sharply increased this year. As in the past years, the concrete unit continued to cooperate with the Bureau of Standards Cement Reference Program by testing various cements, and with the AASHTO Materials Reference Laboratory by testing various aggregate samples. The total number of samples which were tested by this unit during the past fiscal year were over 7500.

### SOILS UNIT

The soils unit was responsible for the testing of soils and soil aggregate materials. This assured the Department of the quality control of materials used in its projects and also provided basic data to the Design Engineer. Materials tested by this unit are gravel borrows, ordinary borrow, embankment materials, sand, bridge foundation materials, loams, peats etc. Plantings used in roadside beautification were also inspected for conformance to the standards established by the American Standards for nursery stock. In addition to this normal routine testing,





## RESEARCH AND MATERIALS SECTION

samples of soils were submitted for testing and classification by both the Soil Conservation Service and Water Resources Division of the U. S. Geological Survey. The total number of samples tested by the Soils Unit in the past year was approximately 400. In addition there were approximately 500 samples tested for the U. S. Geological Survey, Dept. of Conservation, and Soils and Foundation Unit.

### CHEMICAL UNIT

The chemical unit continued its assigned responsibility for testing certain materials used in the work of the Department.

Examples of the materials tested by this unit for conformance to specifications are paints, protective coatings, adhesives, glass beads, deicing chemicals, herbicides, pesticides, joint sealers, etc. This unit performed many evaluation studies for the Product Evaluation Committee, and conducted in-house research on paints, protective coatings, etc. The Chemical Unit also advises and consults with Department Engineers on problems pertaining to coatings and feasibility studies on new products. This past year the number of water samples has increased 200% as the requests for Chloride analysis has tripled due to increased awareness of the environment.

The total number of samples tested by this unit in the past fiscal year was approximately 1900.

### FIELD MATERIALS CONTROL UNIT

During Fiscal 1971 this section was responsible for the continuous review and approval of 64 bituminous concrete plants, 84 cement concrete plants, including out of state suppliers.



## RESEARCH AND MATERIALS SECTION

The requirement of automated batch plants for projects involving 15,000 tons or more of bituminous concrete has engendered a marked increase in the number of suppliers installing such facilities. As of the spring of 1971, half of the producers who normally supply Massachusetts were operating automated batch plants or were soon to be capable of such.

In view of the above, three seminars were again held during the winter months to acquaint industry, and department personnel new to this method of operation, and also to discuss any pertinent information derived from the previous construction season.

The practice of evaluating bituminous concrete job mix formulas by the Marshall Method was continued with 40 such analyses performed.

In this time period, 96 Federally aided roadway related construction projects were active. Conformance with Bureau of Public Roads requirements necessitated record sampling and inspection to be performed as follows: bituminous concrete construction - 147 progress and 143 final; cement concrete construction - 78 progress and 57 final; steel reinforcement - 56 progress. Review and evaluation of documentation of materials quality control for final certification of completed projects was conducted for 51 separate projects.

Twenty-six stone quarries and 49 sand and gravel aggregate producers required semi-annual quality control sampling.



## RESEARCH AND MATERIALS SECTION

The policy of pre-sampling bituminous emulsions at the two main sources of supply, prior to bulk deliveries was continued.

Review and recommendations of change for updating the standard specifications for proposed 1972 edition was conducted, especially in the areas of bituminous concrete and cement concrete.

Participation on In-House-Research Committee on distressed pavements was continued.

A policy of spot checking the amount of galvanizing on steel beam guard rail construction by use of elcometer gauges was initiated.

### MANUFACTURED PRODUCTS

#### 1. PRESTRESSED BEAMS

Twelve bridge structure projects designed with prestressed beams were fabricated. These included I-beams, Box beams and slab beams. All the necessary inspection was performed to insure a quality product. No beams were stamped or shipped until such time that all physical measurements were obtained and recorded or until all visible defects were remedied. At the present time there are four (4) fabricating plants in the State. At the rate of use, these unique bridge designs have high potential.

#### 2. CONCRETE PIPE

Although the use of pipe, for this fiscal year, was low as compared to other years, the inspection required the same diligence. All the necessary strength tests on all pipe were performed and



## RESEARCH AND MATERIALS SECTION

### 2. CONCRETE PIPE CONT'D

recorded as required. In conjunction with pipe testing, precast manholes and catch basins were also tested and inspected.

At the present time there are seven (7) pipe plants in Massachusetts, two in Connecticut and one in New Hampshire.

### 3. METAL PIPE

All necessary tests and inspection, as required, were performed on metal pipe.

Three plants are located in Massachusetts and in Vermont.

Hydrostatic tests were also made on high pressure steel water pipe requiring pressures up to 300 pounds per square inch.

### 4. MISCELLANEOUS

Inspections and tests are performed on concrete posts and blocks, metal castings, and other products pertinent to road building.

### 5. SPECIAL DUTIES

In many instances, the unit has been called to investigate the performance of pavements, the set-up of special gravel and stone specifications, and specifications changes, as submitted by task force committees of AASHO and ASTM.

## SOILS AND FOUNDATION UNIT

In Fiscal 1971 the Soils and Foundation Unit expanded it's work load considerably and assumed a larger responsibility in many functions. Twenty-three (23) advertised boring contracts valued at approximately \$700,000.00 were reviewed and processed b





RESEARCH AND MATERIALS SECTION

this Unit. This includes the review and approval of the complimentary boring programs with recommendations forwarded to the Bridge Department. The two (2) Statewide (open end) boring contracts were monitored by Soils and Foundation. Eight projects valued @ \$14,139.00 were completed in Districts 1, 2, and 3 and sixteen (16) projects in District 4 through 6 valued at \$23,751.00. The Department's boring crew which works directly under the supervision of this Unit completed seventeen different projects. Four (4) of these projects were Salt Studies performed in conjunction with the U. S. Geological Survey (Ground Water Resources Div.). This work which is done to determine the chloride content of community well system is expected to be greatly expanded in the next fiscal year. The liaison work with the U. S. Geological Survey Branch for Regional Geology in New England continues as before. This work includes reviewing problems that occur during construction, mostly relative to ledge slope problems. Eleven (11) Administrative Reports were submitted for Geologic and Seismic Investigations.

The Soils Unit tested sub-grade material for twenty-six projects, eight of which are for overlays for existing roadways. From the results of these tests, Design Bearing Ratios are obtained to be used by the Design Section to arrive at pavement thickness requirements.

The review of all construction projects relative to compaction and density results and sub-base materials is the



## RESEARCH AND MATERIALS SECTION

responsibility of Soils and Foundation. The nuclear density gauge was used extensively throughout the year for checking the in-place densities of bituminous embankment and sub-base materials. The use of this gauge has proved to be very successful and consideration should be given to purchase enough additional gauges to supply one for each District.

During Fiscal 1970 the sophisticated Soils equipment previously purchased has become operational. Three (3) people from Soils and Foundation completed courses at M. I. T. relative to the use of this equipment. In the next fiscal year we should be able to perform triaxial and consolidation test, thereby expanding the capabilities of our Soils Laboratory which normally performs gradations, California Bearing Ratios, Atterberg limits, hydrometer analysis, organic content and permeability tests.

Personnel from the Soils Section continue to participate in cooperation with M. I. T. in the operation of the following Research projects:

R12-2 Movement and Stability of Cuts and Fills

R12-5 Frost Susceptibility of Massachusetts Soils

The Soils and Foundation Unit hosted the Eleventh Annual Conference of the Northeastern Highway Departments. This annual conference was held in Massachusetts for the first time and proved to be successful. All the Northeastern States participated in the meeting with a mutual exchange of ideas and solutions of



## RESEARCH AND MATERIALS SECTION

various soils problems discussed. Several Federal Highway Administration Officials attended the meeting along with many Department people other than those from the Soils Unit.

### RESEARCH UNIT

The Research Unit had no staffing until late 1966 when all the functions of research were transferred to the Research and Materials Section and it was charged with full responsibility of the administration of all research within the Department. This included preparation of budgets, submission of budgets, submission of budgets to the Department and the Federal Highway Administration, anticipation of new research and liaison with research contractors and other Sections of the Department.

This past year the Research Unit was responsible for \$350,000 in active research and \$277,500 in now proposed research using HPR funds. Projects under active research include: roadside development, which is looking into better cover for slopes; hydrologic studies, which is going to develop new formulas for design of small waterways; and highway soils and foundations, two studies, one which is predicting the movement of soil underneath an embankment and the other is developing a rapid test for determining frost susceptibility of Massachusetts soils. New research for this year includes a means for determining the migration of chlorides through the hydrologic system, pavement studies and skid studies. This project for migration of chlorides is a significant step in an effort to find an



## RESEARCH AND MATERIALS SECTION

answer to an environmental prob .

The past year the Joint Highway Research Project with Massachusetts Institute of Technology produced a report on sloughing of slopes and provided a work plan for an intensive study of downdrag (negative skin friction) of piles. This program, annually funded for \$30,000 has been a cooperative program with M.I.T. since 1950 and has produced many outstanding reports.

Field Experimental Projects on Construction Projects, in cooperation with the Federal Highway Administration are coordinated with the Districts. One such project this past year was corrugated break-down lanes. Another project is a comparison of cast-in-place curbing vs pre-cast granite curbing in terms of durability and cost.

Four times a year, the Research Section edits and has published by the Department, a Research Activities Report which is distributed nationwide.





C



## CONSTRUCTION SECTION

During the 1971 fiscal year the value of construction projects awarded dropped to a very low figure of \$38,000,000. The total length of these projects is only 35 miles. This decrease may be accounted for to a great extent by the Governor's curtailment of construction within Route 128. However, work continues on sections of I-93 and I-695 where we have four contracts with a total value of \$70,000,000. The largest contracts awarded this past fiscal year are located between Fairhaven and Wareham on Route I-195. Their value is just under \$15,000,000 with a total length of about ten miles. Our safety program was expanded this year and comprised 21 separate contracts with a total value of over \$6,000,000.

Seven landscaping and rest area construction projects accounted for \$700,000 worth of work.

The TOPICS program (Traffic Operations Program to Increase Capacity and Safety on urban streets) continued with the award of six contracts with a value of nearly \$2,000,000. It is to be expected that this program will be expanded during the next fiscal year.

A detailed analysis of the projects started during the 1971 fiscal year follows:



CONSTRUCTION SECTION

PROJECTS AWARDED DURING FISCAL 1971

INTERSTATE

I-91

BID

West Springfield-Holyoke #15351	Landscaping	\$ 131,943.05
Bernardston #15392	4.791 Miles	1,165,256.52
	<u>4.791 Miles</u>	<u>\$1,297,199.57</u>

I-95

Boston #15676	Demolition	76,475.00
Saugus-Lynn-Peabody #15852	Demolition	9,484.00
		<u>85,959.00</u>

I-195

Fairhaven-Mattapoisett #15677	3.683 Miles	5,274,747.70
Mattapoisett-Marion #15565	3.359 Miles	2,533,893.00
	<u>7.042 Miles</u>	<u>7,808,640.70</u>

I-290

Worcester #15272	Safety	892,413.00
Auburn-Worcester-Shrewsbury #15758	Landscaping	256,726.50
		<u>1,149,139.50</u>

I-495

Haverhill-Merrimac-Amesbury #15246	Landscaping	73,776.50
Boxborough-Chelmsford #15564	Safety	181,038.00
Littleton-Westford-Chelmsford #15692	Safety	91,401.00
		<u>346,215.50</u>

PRIMARY, SECONDARY & URBAN

Route 1

Saugus #15345	0.260 Miles	1,414,547.50
Dedham-Boston #15515	1.025 Miles	1,265,491.00
	<u>1.285 Miles</u>	<u>2,680,038.50</u>

Route 1A

Wrentham #15333	Bridge	409,440.00
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Route 2

Fitchburg-Leominster #15581	3.765 Miles	1,756,893.90
Lexington-Arlington-Belmont #15778	Landscaping	157,836.25
	<u>3.765 Miles</u>	<u>1,914,730.15</u>



CONSTRUCTION SECTION

PROJECTS AWARD DURING FISCAL 1971 (Cont'd)

Route 3

Braintree-Weymouth #15247	Safety	\$ 56,185.00
Burlington-Bedford #15325	Safety	768,423.50
Bedford-Billerica #15352	Safety	375,976.80
Billerica #15384	Safety	529,866.00
Billerica-Chelmsford #15397	Safety	467,829.20
Chelmsford-Tyngsborough #15409	Safety	438,897.90
Chelmsford-Tyngsborough #15584	Safety	830,012.20
		<u>3,467,190.60</u>

Route 5

Holyoke #15495	0.615 Miles	1,339,314.15
Holyoke #15693	0.322 Miles	155,069.82
	<u>0.937 Miles</u>	<u>1,494,383.97</u>

Route 6

Marion-Wareham #15331	2.197 Miles	5,507,136.70
Barnstable #15574	Sanitary Bldg.	71,400.00
	<u>2.197 Miles</u>	<u>5,578,536.70</u>

Route 12

Worcester # 15654	TOPICS	488,950.85
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Route 68

Hubbardston #15494	4.670 Miles	265,593.85
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Route 116

Granby-So. Hadley-Amherst #15517	0.568 Miles	278,071.30
Chicopee #15589	Grade Crossing Elimination	942,646.00
	<u>0.568 Miles</u>	<u>1,220,717.30</u>

Route 118

Swansea #15493	1.079 Miles	944,978.85
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Route 128

Wellesley-Newton-Weston-Waltham #15781	Safety	925,682.00
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Andrews Square

Boston #15390	TOPICS	118,671.50
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CONSTRUCTION SECTION

PROJECTS AWARDED DURING FISCAL 1971 (Cont'd)

Watertown Square

Watertown #15548	TOPICS	\$ 392,755.00
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Mountfort & St. Mary's Sts.

Brookline-Boston #15788	TOPICS	38,593.80
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Plymouth Avenue

Fall River #15759	TOPICS	91,175.71
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Dewey Square Tunnel

Boston #15742	Closed Circuit TV	87,744.64
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Lunenburg Road

Lancaster #15281	2.367 Miles	613,480.25
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Various Streets

Pittsfield #15504	TOPICS	499,178.05
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MISCELLANEOUS NON-FEDERAL AID PROJECTS

Route 2

Lincoln #15458	0.341 Miles	38,434.50
Fitchburg-Westminster #15601	4.295 Miles	1,155,100.00
Littleton #15653	Ledge Excavation	177,055.00
Cambridge-Arlington #15696	Safety	35,540.00
Williamstown #15454	Safety	34,406.00
	4.636 Miles	<u>1,380,535.50</u>

Route 3

Kingston #15349	Safety	2,580.00
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Route 3A

Hingham #15406	Bridge	310,984.50
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Route 6

Rehoboth-Swansea-Somerset #15524	0.405 Miles	569,330.00
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Routes 7,8,9,20

Pittsfield-Dalton-Windsor-New Ashford- Hancock #15350	Landscaping	12,959.00
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CONSTRUCTION SECTION

PROJECTS AWARDED DURING FISCAL 1971 (Cont'd)

	<u>Route 16</u>	
Holliston #15449	0.161 Miles	\$ 153,330.00
	<u>Route 18</u>	
Bridgewater #15695	Safety	13,574.50
	<u>Routes 28 &amp; I-495</u>	
Andover #15456	Safety	13,758.75
	<u>Route 32</u>	
Ware #15599	0.189 Miles	192,940.00
	<u>Route 56</u>	
Oxford #15849	Bridge	246,888.00
	<u>Route 57</u>	
Granville #15490	0.445 Miles	332,682.85
	<u>Route I-93</u>	
Medford #15256	Safety	62,948.00
	<u>Route I-95</u>	
Lynn #15429	Demolition	1,560.00
	<u>Route 106</u>	
East Bridgewater #15834	Bridge	331,164.10
	<u>Route 112</u>	
Worthington #15417	Bridge	124,747.00
	<u>Route 122</u>	
Paxton #15499	0.218 Miles	318,391.50
	<u>Route 128</u>	
Weston #15407	Safety	12,874.00



CONSTRUCTION SECTION

PROJECTS AWARDED DURING FISCAL 1971 (Cont'd)

Route 133

Essex #15482	Bridge	384,634.00
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Route I-495

Milford #15626	Ledge Excavation	\$ 9,000.00
Hopkinton #15757	Landscaping	<u>18,569.00</u>
		27,569.00

Main Street

Chester #15282	Bridge	215,558.25
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Boston Road & Parker Street

Springfield #15283	Safety	359,796.80
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Main & North Main Streets

Acushnet #15370	0.818 Miles	164,270.00
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Edgartown-Vineyard Haven Road

Oak Bluffs-Tisbury #15425	Landscaping	3,230.00
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Main Street at Tonset Road

Orleans #15447	Safety	10,162.00
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Routes 106, 140 & North Main Street

Mansfield #15463	Pressure Grouting	81,510.00
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Bridge Street

Aguam-West Springfield #15516	Mittineague Bridge	881,144.50
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South Main, North Main, Center & Wareham Sts.

Middleborough #15600	Safety	6,250.00
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CONSTRUCTION SECTION

PROJECTS AWARDED DURING FISCAL 1971 (Cont'd)

Rennapo Road

Sheffield #15851	Bridge	468,865.00
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SUMMARY

	<u>Miles</u>	<u>Amount</u>
INTERSTATE	11.833	\$10,687,154.27
PRIMARY, SECONDARY & URBAN	16.868	21,231,841.72
NON FEDERAL AID	6.872	6,684,237.25
TOTALS	35.573	\$38,603,233.24





## CONTRACT ENGINEER SECTION

The Contract Engineer's Section processes the bids for Federal Aid Projects requiring B.P.R. Concurrence, State Highway Construction Projects, Chapter 90 Projects, Maintenance Projects, Waterways Projects, Boring Projects, projects for the construction, reconstruction, alternation, remodeling, repair, or demolition of buildings under the provisions of General Laws, Chapter 149, and Right of Way Projects involving the sale of houses, and the leasing of State-owned property, from bid opening to award of contract and maintains all the necessary records therefor. The prequalification and post-qualification of contractors is administered by this Section and the issuance of Proposal Forms and plans to prospective bidders requires the approval of this Section. Force account agreements with public utilities, cities and towns are reviewed for approval.

### MAJOR ACTIVITIES

1. At bid openings all proposals are publicly opened and read subject to verification for arithmetical correctness, examination for informalities and compliance with applicable statutes.
2. After a bid opening all proposals are immediately checked for compliance with requirements. Proposals that are unacceptable due to incompleteness, irregularities, collusion, qualifying clauses, etc., are duly noted and if the deviation is a matter of substance that is prejudicial to the rights of other bidders a recommendation for rejection of such bid is made on the other hand, a deviation may be merely a matter of form or some immaterial variation from the exact requirements that can be waived by the Commission under the right reserved. In the latter instance, if such bid is the lowest bid submitted, a recommendation will be made that



## CONTRACT ENGINEER SECTION

### MAJOR ACTIVITIES (Cont'd)

the informality be waived and the project awarded to the low bidder as being in the best interest of the Department. After all bids have been checked and verified a "Summary of Bids" is prepared, printed and collated for distribution to interested Sections, Divisions, District of the Department, contractors who bid on the particular project, and local trade magazines and publications. Copies are retained for the Sections Records.

3. Letters recommending award or rejections are prepared and typed by this Section for the Chief Engineer's signature for presentation to the Board. Such letters are routed to our Fiscal Section for an assignment of funds. For work involving Federal Funds, letters are also prepared and typed for the Chief Engineer's signature, requesting Bureau of Public Roads concurrence in the award or rejection of contracts as required by Federal Regulations.

4. Prequalification Statements submitted by contractors as required by General Laws, Chapter 29, Section 8B are analyzed, computed, and a Rating determined for submission to our Prequalification Committee. Performance Records of Contractors who have previously performed work for this Department are maintained in this Section, and are designed to provide facts and documented data on every completed project and the contractor's performance thereon. Such records provide a source of information for recommendations made by the Contract Engineer to the Prequalification Committee for the determination of Prequalification Ratings or limitations thereon as warranted by the facts.

5. For projects for which prequalification is not required, the low bidder and/or the lowest responsible bidder must submit a post-qualification statement, duly signed and sworn to, outlining his experience, equipment and



CONTRACT ENGINEER SECTION

MAJOR ACTIVITIES (Cont'd)

financial resources on forms supplied by this Department. These post-qualifications statements are computed and analyzed exclusively by this Section and on the basis of the computation and analysis a recommendation for award or rejection is made to the Board.

6. Since the enactment of the Prequalification Statutes all requests for Proposals and Plans for bidding purposes have to be cleared and approved by this Section. This policy was adopted so as to prevent the issuance of Proposals and Plans to contractors who are ineligible to bid because of failure to meet the requirements of the Prequalification Statute and Regulations.

7. Records of all activities of this Section are maintained for purposes of documentation and a source of information.

(a) A complete alphabetical file of all contractors who have performed work for this Department is kept current at all times. This file shows the location of each project which the contractor has performed, the advertising date, bid opening date, bid amount, date of award, and starting and completion dates.

(b) A card index file for each project awarded, showing date of advertising, opening of bids, date of award, office estimate, bid price, contractor's name and address, contractor's qualification, start of construction, date of completion, extensions of time, if any, and contractor's performance record.

(c) A card file of projects awarded in each city or town, showing name of contractor, type of project, and the starting and completion date of all contracts performed within the city or town.



CONTRACT ENGINEER SECTION

MAJOR ACTIVITIES (Cont'd)

(d) Prequalified contractors, their prequalification rating and date of expiration.

(e) A list of "Active Bidding Contractors" who submit bids for any project for this Department each calendar year is prepared and maintained.





CONTRACT ENGINEER SECTION

MAJOR ACTIVITIES (CONT'D)

PROJECTS AWARDED FOR FISCAL YEAR ENDING JUNE 30, 1971

<u>NUMBER</u>	<u>CATEGORY</u>	<u>AMOUNT</u>
40	FEDERAL AID	\$ 31,918,995.99
34	STATE HIGHWAY CONSTRUCTION	6,685,742.75
45	CHAPTER 90	6,120,259.65
332	MAINTENANCE	10,559,735.87
32	WATERWAYS	5,750,611.75

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483	TOTAL	\$ 61,035,346.01
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During the fiscal year July 1, 1970 to June 30, 1971 a total of 299 Contractors were prequalified.



## FINAL REVIEW SECTION

The work of the FINAL REVIEW SECTION consists of checking each of the quantities for the various items which represent the amount of work done by a contractor in constructing with the Department of Public Works. This checking consists of reviewing all supporting data for each of the various items as recorded in manifold books, pile books, calculation books, time books and other records of the Resident Engineer; the plotting and sub-grading of final roadway, rock and peat cross-sections so that an accurate final pay quantity may be determined; and the computation of borrow pit quantities based on preliminary and final surveys of the borrow areas. After determining each of the final quantities of the various projects, a cost sheet is prepared so that the construction engineer and others may know the cost comparison with bid and allotment amounts, and a careful analysis is made between the Resident Engineer's quantities and the Fianl's quantities as well as between the Preliminary and Final quantities so that explanations of all differences which exceed 10% may be determined and prepared. Greater use is being made of the computer for deriving accurate pay quantities for Roadway, Rock, Peat and Loam stripping items.



FINAL REVIEW SECTION

A recent innovation, the "Quality Control Ledger," that documents and expedites projects work has proven its worth to the satisfaction of all concerned.

A manual of instruction for the preparation of final estimates and reports for highway and bridge projects was prepared. The manual has gone to press.

The Final Review Section was requested to cooperate with the Attorney General in the comprehensive study of the amount and value of concrete pipe used in highway construction during the past several years. The net result, in an anti-trust suit, was the recovery of \$400,000 to be distributed to the state and municipal governments for which the Final Review Section was complimented by the Attorney General's Office for their assistance.

"Pre-Final" review terms have been formed which consist of 2 or 3 men from the Final Review Section who are requested to visit various projects nearing completion and finalize items directly at the construction site. This operation reduces controversies and expedites the processing of the project because the availability of the Resident Engineer affords the opportunity to solve any differences of opinion immediately and effectively. This procedure has been accepted favorably by the Districts.

The following is a "Breakdown" of the value of contracts processed by the Final Review Section during the period from July 1970 through June 1971 . . . . .



FINAL REVIEW SECTION

BREAKDOWN VALUE OF CONTRACTS PROCESSED BY THE FINAL  
REVIEW SECTION

VALUE OF STATE HIGHWAY CONSTRUCTION CONTRACTS:

HAVING FEDERAL AID PARTICIPATION = \$ 81,077,076.79

VALUE OF STATE HIGHWAY CONSTRUCTION CONTRACTS:

NON-FEDERAL AID = 3,472,935.60

VALUE OF STATE AID (Chapter 90) CONTRACTS: = 6,251,227.29

VALUE OF MAINTENANCE CONTRACTS: = 5,371,798.49

VALUE OF MISCELLANEOUS CONTRACTS: = 7,185,577.71

(Includes Consultant Services, Boring  
Contracts, Boston - P.W.B. Contracts),  
Traffic, etc.)

TOTAL \$ 103,358,615.88

NOTE:

Not included in the above totals are thirty-five (35)  
Federal Estimates (FINAL FEDERAL AID VOUCHERS) which  
were submitted during the period of July 1970 through  
July 1971.





## PROCEDURES & RECORDS SECTION

This section is responsible for the continuous, comprehensive and systematic review of the records, policies and procedures relating to the technical operations performed by organizations reporting to the Chief Engineer.

### I. MAJOR ACTIVITIES

#### A. Project Reviews

Active highway and bridge construction projects are reviewed by engineering teams conducting on-site "In-Depth" inspections to assure compliance with Contract Specifications, Department Standard Operating Procedures and other controls. Over the past year, teams have conducted approximately ninety (90) reviews. Reports are submitted directly to the Chief Engineer with copies distributed to the Construction Division, Research & Materials Division, respective Districts and the Federal Highway Administration Division Office.

Project Reviews insure the maintaining of established high standards of construction and acceptable documentation of pay items assuring prompt reimbursement of funds from the Federal Government. The resulting Statewide uniform system of record-keeping procedures provides development of field personnel trained for assignment in all eight (8) Districts and many varied sections of the Department.

By reporting directly to the Chief Engineer, the section is afforded necessary independence and, furthermore, implementation of recommendations is expedited and assured.

#### B. Equal Employment Opportunity

The Procedures & Records Engineer was designated Department EEO Coordinator subsequent to and in accordance with the provisions of



PROCEDURES & RECORDS SECTION

I. MAJOR ACTIVITIES (Cont'd)

the Federal Highway Act of 1968. Non-discrimination and Affirmative action by Contractors and State Highway Agencies was to be rigidly promulgated and enforced via Interim Orders 7-2, 7-2(1) and 7-2(2) of the Federal Highway Administration. Dependent on applicability, these orders are made part of the Contract Special Provisions on all Federally Aided Projects.

Implementation of procedures, review of compliance and required reporting relative to EEO was delegated to the Procedures & Records Section apparently because of the working relationships within the Department developed during construction project reviews and prior liaison work with the Federal Highway Administration.

1) Implementation

As stated in the foregoing, FHWA Orders are included in Contract Specifications. Personnel of the Section provide interpretation and consultation at Preconstruction Conferences and other meetings with Contractors and State project personnel.

2) EEO Compliance Reviews

a) Working both independently and in conjunction with representatives of the FHWA Division and Regional Offices, personnel of this Section have conducted numerous on-site project reviews of Contractor activities to develop EEO Affirmative action

b) Similarly, reviews have been conducted at the home office of all Contractors who have Federally reimbursed contracts of substantial value.



PROCEDURES & RECORDS SECTION

I. MAJOR ACTIVITIES Cont'd

Included are the following:

PR-1391 - Contractor's Employment Data Form

PR-1392 - Compilation of PR-1391 Forms

FHWA - 1409 - Contractor's Quarterly Training Report

FHWA - 86 - Compliance Data Report Form

b) Written reports of 1) Implementation and 2) EEO Compliance

Reviews above are submitted to the EEO Coordinator and Chief Engineer with copies to the Construction Division and appropriate District as well as FHWA.

4) Training

Interim Order 7-2(2) provides for On-the Job Training by Contractors on selected projects to introduce minorities and disadvantaged persons and up-grade personnel to journeyman status in the Highway Trades.

5) Miscellaneous

Personnel of this Section have instituted and actively participated in meetings and seminars with other governmental agencies, contractor organizations, unions and minority group organizations to promote better understanding and development of meaningful cooperation in the area of Equal Employment Opportunity.

C. Standard Operating Procedures

This Section continued its function of reviewing all proposed SOPs concerning engineering or technical operations. Where necessary, investigations were conducted and SOPs edited to clarify procedure or enunciate policy.



II. SPECIAL ASSIGNMENTS

A. Final Vouchers

This Section was assigned the task of expediting the processing of Final Vouchers and resolving problems and questions which had delayed Federal reimbursement for Construction Projects physically completed in prior years.

P&R has continually been available to and utilized by Fiscal Management in resolving Final Voucher citations, In 1970, substantiation was produced for reclaims amounting to \$448,479.56.

B. Construction Safety

The Federal Occupational Safety & Health act of 1970, through the Department of Labor, "Safety & Health Regulations for Construction" once again involved the Section at the request of the Commissioner and Chief Engineer to investigate the obligations and responsibilities of the Department. At this time, it would appear that a revised manual will be prepared within a year to conform with updated regulations of the Massachusetts Department of Labor & Industry.

The AASHO Organization has already assigned a Committee to formulate such a manual to be made available to member states.

C. Department Census Report

As per the request of the Chairman of the Massachusetts Commission Against Discrimination and in compliance with Article II of the Governor's Code of Fair Practices, this Section solicited, collated and summarized a census of all Department personnel by grade and sex and comparative totals of "racial minority groups".





II. SPECIAL ASSIGNMENTS Cont'd)

D. Public Hearings Review

This Section was delegated to review the Department's method of conducting Public Hearings, both Corridor and Design Hearings. A detailed report was submitted to the Chief Engineer with a proposed suggested draft of a manual.

E. Maintenance - Permits

In response to the request of the Commissioners, a review was conducted of policy and procedures relative to issuance of Department Permits. Permits are generally separated into two (2) main categories because different Laws are applicable:

- a) for work within State Highway Layouts
- b) to move loads in excess of Legal Limits

On the basis of the report- additional personnel were assigned and a committee was appointed to more specifically define Department policy.

F. Summer Youth Opportunity

This Section prepared the correspondence, again this year, soliciting Contractors and Consultants of the Highway Industry to provide employment for disadvantaged youths through the Summer Youth Opportunity Program.

Last year, 36 replies from the over 325 firms contacted reflected the employment of 152 youths.

With work much curtailed this year, we can only hope to match or exceed the limited success realized a year ago.

III. LIAISON WITH OUTSIDE AGENCIES

A. Federal Highway Administration (formerly Bureau of Public Roads)

In addition to formal contact with the Division and Regional Office of the FHWA, the Section has developed an excellent report.



III. LIAISON WITH OUTSIDE AGENCIES (Cont'd)

Our personnel have participated in Seminars and Workshops. Auditors and trainees from the FHWA have reviewed the Section's procedures and accompanied teams on project reviews resulting in recommendations to other states to implement similar Internal Audit procedures.

B. AASHO and AHCNAS

Information and critiques have been developed at the direction of the Chief Engineer and Commissioner for presentation before technical working committees.

C. Other States

Acting as liaison for the Department, this Section has prepared replies to general and specific inquiries from sister states.

D. Contractor Organizations

A cordial and beneficial relationship has been maintained with the New England Road Builders Association (NERBA) in the areas of EEO and Safety as well as continued cooperation in other areas of mutual interest and involvement.

The new Massachusetts Association of Transportation Contractors (MATCO) has consulted with the Section and a productive relationship seems assured.

E. Unions

Involvement in EEO has brought us into contact with industry related Unions. Cooperation in the areas of minority referrals and the development and extension of Training Programs augurs well for positive progress.

F. Minority Organizations

Working liaison as continued to be fostered throughout the State.



## PROCEDURES & RECORDS SECTION

### III. LIAISON WITH OUTSIDE AGENCIES (Cont'd)

Not only in the area of Contract projects but also via distribution of Civil Service posters to local organizations by District Highway Engineers, we have encouraged minority employment.

#### C. New Bedford - Ad Hoc Committee

A special committee was established during this year to provide communication and establish cooperation among Highway related agencies and groups in this critical area of unemployment, greater New Bedford. The committee is comprised of the representatives of the following:

FHWA - Washington

FHWA - Division (Boston)

Massachusetts - Governor's Office

Mass. DPW - Procedures & Records Engineer

Area Highway Contractors

Unions - Masons & Laborers

Community - CEP - On Board

The P&R Engineer was named Chairman and meetings to date indicate optimism.

In conclusion, this Section is available, upon request through the Chief engineer/Commissioners, to offer assistance, guidance, cooperation, coordination and communications necessary to promote a Department that we, together as employees, can be proud of and one in which the public can feel confident that is working in their best interests to promote a more effective and efficient Agency.

Our appreciation to the chief Engineer for his direction, endorsement and support.



**D**





## MAINTENANCE SECTION

### CONFERENCES AND MEETINGS

During Fiscal 1971 ten conferences were held under the chairmanship of James F. Kelley, Maintenance Engineer.

Four conferences were on General Maintenance, namely, Personnel, Management, Communications, Maps and Statistics, with other subjects submitted by each district for open discussion.

One conference each was held on Structures, Highways, Equipment, Roadsides and Traffic. A Snow and Ice Control School was conducted in each District.

All District Highway Engineers, District Maintenance Engineers, Assistant Maintenance Engineers, and their respective Unit Assistants were present and/or represented at these conferences.

The purpose of said conferences was to discuss various Maintenance policies; review problems, and reaffirm uniformity of operations.

Also this year representatives of the Bureau of Public Roads were invited, and they discussed various aspects of Maintenance and noted that they would appreciate being invited to future conferences.

Certain of our maintenance operations throughout all Districts of the State have proven to be adaptable to contractual services, rendering the performance of the work more efficient and economical.

This work includes such roadside items as mowing, tree trimming, tree removal, mist blower spraying, soil sterilants, travel trash disposal, also other items such as bridge painting, certain traffic installations, repairs and painting.



## MAINTENANCE SECTION

### CONFERENCES AND MEETINGS (Cont'd)

Since these items of work are carried out on a Statewide basis and contractors frequently bid on the same type of work in several districts, the policy of advertising this type of work in multiple proposal covering a number of individual projects throughout the State was adopted.

We also, at this time, decided to hold prebid conferences on these proposals prior to the opening of bids. At these conferences uniform interpretation of the specifications and special provisions for the project, along with changes over previous years are discussed so that there will be uniformity of performance and inspection of the work throughout the State.

District personnel as well as Boston Maintenance personnel involved in the various contracts, together with all bidders for the work, are invited to attend. Usually about a dozen such conferences are held during a Fiscal Year.

In connection with contract services for Safety Line Painting, there were two (2) PERFORMANCE CONTRACTS awarded during Fiscal Year 1971 and these have aroused much interest through the country. These contracts stipulate that the contractor has a certain portion of the roadway to maintain for a period of two (2) years after the initial application.

The applied Safety Lines must be maintained in a condition that will be equal to or better than the minimum reflectivity standard which is located at the Research and Materials Section in Wellesley.

The contractor has a choice of materials he may use for the performance contract as long as the line is maintained in good condition. The performance lines are inspected from time to time and, if they do fall below the standard, the contractor is penalized by a monetary deduction from monies



## MAINTENANCE SECTION

### CONFERENCES AND MEETINGS (Cont'd)

owed him. Routine payments consist of periodic percentage payments through the life of the contract. In Fiscal 1972 it is proposed that more safety line contracts will be of the performance type.

The Maintenance Engineer presented a paper on this subject at the 1971 meeting of the Highway Research Board. It is a first in the country.

The Maintenance Engineer is Chairman of the Highway Research Board Committee "Roadside Maintenance". He is also a member of two other committees, "Maintenance Equipment" and "Maintenance and Operations Personnel".

The Maintenance Section was responsible for the physical maintenance and certain traffic services of 2,730 linear miles of State Highway and 2,010 bridges.

The present total of 2,730 linear miles represents a total of 9,530 lane miles as compared to 9,460 lane miles in Fiscal Year 1970. The 2,010 bridges represent a work load area of 2,399,900 square yards.

### HIGHWAY MAINTENANCE

For the purpose of maintaining the surfaces of our State Highway System, including drainage facilities, shoulders and guard rails, each of the eight Districts of the State is divided, geographically, into working sections containing as nearly as possible, ninety (90) lane miles of surface. Due consideration is given to other pertinent factors, such as isolated sections of State Highway, physical barriers etc., and necessary temporary adjustments made during the procedure of establishing the working sections.



## MAINTENANCE SECTION

### HIGHWAY MAINTENANCE (Cont'd)

Each maintenance section is staffed in accordance with a previously approved staffing formula within the limits of positions and personnel made available to the Department by others.

Maintenance consists of routing physical maintenance work and betterment work. Physical maintenance consists of maintaining the highway and its existing facilities or restoring it to its originally constructed condition and included surface treatments with liquid butumens and cover aggregate, or as has been the case almost entirely for the last fourteen years treatment by the application of bituminous concrete overlays of less than 3/4" in depth.

Betterments include improvements and additions to the originally constructed highway, such as drainage and guard rails and includes overlays of 3/4" depth and over, which represent capital outlays.

### BETTERMENTS - FORCE ACCOUNT

Five (5) Force Account Betterments, located in Districts 4, 5, and 7 were approved to be carried out by District Maintenance Forces during the year at a total estimated cost of \$6,000.00. Work performed included new drainage and guard rail installation.

Five (5) Betterment Projects, located in Districts 3 and 6 were carried out by contract during the year at a total cost of \$78,000.00. Project work involved new drainage installations. Funds for this work were mostly from the Accelerated Highway Program.





## MAINTENANCE SECTION

### RESURFACING

Although only \$2,000,000.00 was appropriated and allotted to the resurfacing account for Fiscal 1971, an additional \$1,500,000.00 was made available from the Accelerated Highway Program. Reverts from re-surfacing projects in the Fiscal 1970 Program added another \$350,000.00 to the total funds available.

Accordingly a total of twenty-three (23) contracts were awarded during the year for the resurfacing of approximately forty-nine (49) miles of highways with Class I Bituminous Concrete Type I-1, varying in widths of from 24 feet to over 60 feet and varying in depth from 1-1/4" to 3".

Physical maintenance and betterment projects are carried out both by using Department forces and by contract. As our lane mileage increases each year, because of our lack of sufficient personnel and in the interest of economy and allowable time, most of the major items of maintenance, either physical or betterments, are being performed under advertised contracts.

The substance of this report will deal primarily with a summary of major items of physical maintenance carried out by contract and with betterment work carried out by contract, including resurfacing.

### PHYSICAL MAINTENANCE

Routine maintenance operations were carried out by Department Maintenance Forces, and included such operations as minor shoulder repairs, and certain shoulder or surface treatment with liquid bitumen and sand or stone cover. A regular program is prepared to carry out surface treatment throughout the eight (8) Districts of the State by the application of Class I Bituminous Concrete Type S. T.



## MAINTENANCE SECTION

### PHYSICAL MAINTENANCE (Cont'd)

This year thirteen (13) contracts were awarded for surface treatment covering a total of approximately thirty-four (34) linear miles.

The Department has no maintenance depot or personnel located on the Island of Nantucket; therefore, maintenance of the only State Highway (Siasconset Road) on the Island has been carried out by the Town of Nantucket under a contract with the Department. The sum of \$10,000.00 was allotted for this work.

### MISCELLANEOUS

Preparation of the report on "Quotation Prices per ton for Bituminous Concrete Patching Mix furnished and loaded at Plant" was completed following the "Critical Path Method Chart" used for the past couple of years and with additional assistance by the computer section.

Maintenance appropriations are substantially inadequate to properly carry out needed maintenance and betterment operations if we are to keep pace with the constantly increasing mileage of our State Highway System owing largely to the construction of the Interstate System.

Delay in obtaining funds for surface treatments at the time they are initially proposed frequently results in deterioration of the surface where resurfacing becomes necessary at a much greater expense. Likewise, assignment of funds near the end of a fiscal year, as has been done in previous years, does not allow sufficient time for the preparation of contracts and completion of the work before the end of the fiscal year, at which time use of non-continuing accounts expire.

Therefore, it is recommended that:

1. Appropriations for proper maintenance of our Highway System be made



## MAINTENANCE SECTION

### MISCELLANEOUS (Cont'd)

commensurate with the normal requirements for same.

2. Such steps as necessary be taken from time to time to encourage the Legislature to make provisions for the preceding recommendation.

### TRAFFIC MAINTENANCE

Fiscal 1971 has seen a continuance of accelerated technological development in the Traffic Maintenance field. This development has served to remind those involved in this type of work that there is indeed an ever widening gap taking shape between those who design and develop and those who install and maintain. Admittedly the design people must lead but often times there just are not the resources and/or people available in Maintenance to follow up with an adequate program. The plea for additional funds, personnel and positions is made year after year with little relief and yet Maintenance is expected to get the job done, despite the increase in work load.

In order to accomplish the extra work above and beyond the Force Account capacity it has been necessary to let work out to private contractors in just about every area of Traffic Maintenance.

The contract work has been getting progressively larger over the past few years and in some areas this has helped because more contractors have joined in the competitive bidding and thus have gotten some of the prices down to a level that is very reasonable for the Commonwealth.

If more Force Account help is not forthcoming it remains for the Traffic Maintenance Unit to keep a balance between the contract work and the Force Account responsibilities. The maximum effectiveness must be



## MAINTENANCE SECTION

### TRAFFIC MAINTENANCE (Cont'd)

obtained from the Force Account capabilities by providing and programming the purchase of the most efficient materials and equipment while the contract work must be of an amount adequate enough to assure good competitive bidding.

Another factor to be aware of in Maintenance Contracts is to make certain that the nature of the work does not preclude competitive bidding. In some specialized areas it is possible for a few contractors to tie up most jobs regardless of the quantity of work advertised. In spite of all efforts to utilize Force Account and contract work to the limit there just is not enough resources to do a one hundred per cent Traffic Maintenance job for the Department. The deficiencies in individual areas will be discussed under the appropriate categories following.

Much is said year after year about the lack of field personnel to carry out the Safety Line work, or in fact all of the Traffic Maintenance Work and this is certainly true, but little is said about the lack of personnel in the Engineering staff administering the field work.

There is a decided lack of help in the staffing of the Traffic Maintenance Unit and the work load is increasing year after year. As Maintenance enlarges so does the paper work, the programming, the planning, the budgeting and follow through to conduct an adequate Traffic Maintenance Program.

Unless the staffing is increased in this vital area certain functional phases must be curtailed or eliminated to take care of the priorities. It is not in the best interests of the Commonwealth to operate at less than maximum efficiency in this vital area.





## MAINTENANCE SECTION

### SIGN MAINTENANCE

#### FORCE ACCOUNT MAINTENANCE

The maintenance of highway signs can be broken down into two categories, the maintenance of small signs (20 S.F. and under) and the maintenance of the large signs (20 S.F. and over).

The State forces are able to physically handle the maintenance of the smaller signs. These usually include the one post directional signs plus the regulatory, warning and miscellaneous signs. The only drawback found is that there just does not seem to be enough time for the men to get to the signs before they take on a deteriorated appearance and in fact are no longer performing an effective job.

Maintenance on the smaller signs has necessarily consisted of replacement with a new sign. It is not possible nor economically sound to do anything other than wash the smaller signs.

While on the smaller sign category, the Department contemplates a sharply increased work load in this area over the next four years. It is anticipated that this is how long the Federal Government is going to allow for changing over many of the signs to the new signing standards which are due to be released very soon.

The Department has all the equipment to handle and erect the smaller signs except for certain small equipment associated with the erection of breakaway posts. For this work it is going to be necessary for the Department to purchase post hole diggers of a large enough capacity to excavate for the placement of concrete foundations.

In order to maintain the larger traffic signs (20 S.F. and over) it is necessary to get involved with heavier equipment and personnel who are mechanically capable to perform the varied tasks in sign maintenance.



## MAINTENANCE SECTION

### SIGN MAINTENANCE

#### FORCE ACCOUNT MAINTENANCE (Cont'd)

As far as the methods of sign maintenance are concerned the Traffic Maintenance Unit is as well versed as any other unit in the Country. The Sign Maintenance Engineer presented a paper concerning sign maintenance techniques and sign material evaluations at the 50th Annual Highway Research Board Meeting in Washington, D. C. in January which was well received.

#### CONTRACT SIGN MAINTENANCE

There were 3 contract jobs awarded during this past year at a total cost of \$38,000. The work ranged from painting the sign panels at \$1.20 per square foot to replacement of sign panels with new ones at \$10.50 per square foot.

The contracts that call for painting the sign backgrounds usually draw 4 to 7 bidders for each job whereas the one job advertised for replacing with new panels drew only 2 bidders and it is these same 2 bidders who perform the majority of the new sign construction in the State.

Although the Traffic Maintenance Unit knows it can maintain the large nonreflectorized background billboard signs for less money than the reflectorized background signs, it apparently is the choice of design to stay with the reflectorized background signs in the name of Safety.

#### BREAKAWAY SIGN SUPPORTS

There is an ever increasing amount of yielding (breakaway) sign supports being installed on our highways and this ties in with the changeover to new signing standards which will be required in 4 years after release of the Federal Manual on signing.



## MAINTENANCE SECTION

### BREAKAWAY SIGN SUPPORTS (Cont'd)

Approximately 10 of the breakaway sign supports were hit this year with very little vehicle damage, in fact, there is a minor problem involved whereas most of the cars drive away and there is no identification available to charge the damages to.

Slowly but surely the Department is getting stocked up on the hardware to replace the damaged breakaway posts. Fortunately in nearly every case it has been possible to reuse the original post after minor repairs. It would be impossible to carry an adequate stock of the posts themselves because of the varied sizes and variable lengths.

It can be seen that the installation of the breakaway posts by Force Account would have to be done by a specialized crew with specialized equipment. They would need a large post hole digger, compressor, torque wrenches, tension calibrators, small tools and a large truck. Some of this equipment has been requested in the Fiscal 1973 budget.

In the mean time the Traffic Maintenance Unit is preparing a pilot contract for one District to have a contractor install the breakaway posts at several locations and have the Department fabricate and erect the sign panels. It is expected that this type of project will provide much valuable information as to future programs and relative costs.

### SIGN RECORDS

The Traffic Maintenance Unit continued to process the paper work involved in support of a sign maintenance program. This included the checking, filing and forwarding of approximately 1580 individual sign orders, approximately 920 sign erection reports, quarterly inspection reports and overhead sign inspection reports.



## MAINTENANCE SECTION

### EXPERIMENTAL WORK

Experimental and field research consisted of the addition of more samples for weathering at the sign test area in Wellesley plus the introduction of plastic panel signs in various Districts. As the year closes it can be seen that the plastic panel signs will not be adequate. There is tendency for the sign to warp, there is too much preparation before applying sheeting and the cost is considerably higher than the plywood and aluminum now being used.

### COMPUTER RECORDS

The Sign Maintenance Engineer was actively engaged both in the design and the follow thru pilot run of a computerized set-up for a sign inventory. This was a co-operative project with the Traffic Engineering Section and the Data Processing Section. As the work load permits this system is being worked on for refinement.

Another phase of the sign work that is in the process of being computerized is in the area of quantity control. All individual signs are being assigned a stock number. This will enable central control over the number of each individual sign located in stores throughout the State.

### CONSTRUCTION WARNING SIGN SPECIFICATION

The inclusion of specifications and sketches for the placement of Traffic Warning Devices in individual Maintenance Contracts has proven its worth since this has released the Traffic Maintenance field personnel to perform the routine duties rather than spend the prime working weather maintaining construction warning devices and detours.





## MAINTENANCE SECTION

### H R B REPRESENTATION

The Traffic Maintenance Engineer has recently been appointed as the Chairman for the Highway Research Board Maintenance Operations Committee which has to do with protection of the workman on the highway plus the protection of the motoring public. This particular committee representation should be valuable to the Commonwealth, since it will keep the Commonwealth abreast of the latest activity in both Maintenance Operations and Traffic Warning Devices..

### DELINEATION

Delineation continues to be the most poorly maintained installation in the Traffic Maintenance area. The delineators become dirty and are too numerous to effectively clean, they are located in a position on the highway that is susceptible to collision by mowers, snow plows, out of control vehicles and they are also easy prey for vandals.

### MILE AND 1/10 MILE MARKERS

Recently the Commonwealth awarded four large contracts to install mile markers and 1/10 of mile markers on all State highways in the Commonwealth. These markers will serve as delineation in place of part of the regular delineation. As important as these markers are it can be seen that it will take a yeoman effort to keep them in place. This is one more area where contract maintenance may be the only solution to augment Force Account activity.

### NATIONAL HIGHWAY SAFETY ACT

It is evident that the National Highway Safety Act is playing a larger part in new signing throughout the Commonwealth. The mile marker and 1/10 mile marker system, as mentioned above, is but one example. Another example of the influence of the N.H.S.A. is the number of routes that are being up-



## MAINTENANCE SECTION

### NATIONAL HIGHWAY SAFETY ACT (Cont'd)

dated to new standards. This has helped maintenance in that it has postponed certain crises in budgetary allotments. If maintenance funds had to be used to refurbish a route like 128 the job would just not get done with present budgetary allotments. By the use of Federal monies the "Maintenance Work" on the larger signs on the expressway facilities is done through the Safety Updating Program.

### PROPOSED WORK

The sign maintenance work for the coming year is expected to center around the breakaway post installation program and getting all sign records on a computerized program.

### PAVEMENT MARKINGS

#### YEAR ROUND MARKINGS

The volume and the quality of the motoring public demands that there be a pavement marking on the Highway for 12 months a year regardless of the weather.

It has been possible for some sections of the country to attain this goal, nearly all of these sections being in the more temperate climates which do not have snow removal problems.. In spite of the incompatibility of year round effective pavement markings and efficient snow removal activities the Department continues to experiment and research new products that might prove to be the answer to this most important problem.

#### RAISED PAVEMENT MARKERS

During the past year the Department installed what was thought to be the answer to the problem of Safety Line Reflectivity during wet and inclement weather. The units installed consisted of raised markers that were expoied into the pavement. These were installed in the Springfield



## MAINTENANCE SECTION

### RAISED PAVEMENT MARKERS (Cont'd)

and Taunton areas before the snow removal activities began. Slight installation problems were overcome and before snow plowing began the efficiency of these markers were excellent. The markers were especially reflective during wet weather, their presence gave one the feeling of driving along a lighted runway.

The installations were very interesting because there were problems that had to be overcome both by the manufacturer and the field installation crew of the Department. If this very important product is successfully developed the Department's Maintenance Crews involved with these installations certainly contributed to the success.

### BLACK PAINT USED

Black Paint was applied on a cement concrete roadway in the Commonwealth to provide a contrast with the white stripes. This is used in States that have a lot of cement concrete highways. It improved the Safety Line Visibility significantly where applied.

### LIMITED PERSONNEL LIMITED RESEARCH

The Department did not experiment with as many new products this year as in previous years and this was due to two things; First, the Research and Materials section like the Maintenance Section suffered from a lack of personnel to join in all necessary research. Other States have performance teams set up in the area of product and work method evaluation. It is reported that the benefits accrued from such a work team more than compensate for the expense of the operation.



## MAINTENANCE SECTION

### INCREASED USE OF FIELD TESTED PRODUCTS

Larger amounts of products already successfully experimented with were used this year. Some of these products are as follows:

- 1.) Instant dry powder for cross walk and stopline application - four machines were purchased to apply this material. The machines were issued to four of the eight districts which makes five districts having the capability to apply the instant dry powder. 25,000 lbs. of this material were applied this year.

The efficiency of this type product is soon realized by all that try it and it is hopeful that all Districts will have these machines as soon as budgetary allotments permit.

- 2.) Chlorinated Rubber Paint - Approximately 27,000 gallons of the Chlorinated Rubber Paint were purchased during Fiscal 1971. This paint continues to improve in its performance and if perfected could find a permanent place in the stripling program.

The reason that the Chlorinated Rubber Paint is so desirable is that it can be applied hot and cold with improved performance on the hot side. This would mean that it could be applied in any of the Department's machines either hot or cold. Another advantage of the Chlorinated Rubber Paints is that the durability is better than the Hot paints but not as good as the Department's specification cold paint.

- .) Thermoplastic - This year approximately 112,000 lbs. of Thermoplastic pavement marking material was purchased for application by State Forces and approximately 595,000 L.F. of line was installed by contract. The Force Account application works out satisfactorily by buying the material and renting the machine,





## MAINTENANCE SECTION

### INCREASED USE OF FIELD TESTED PRODUCTS

however it would be more efficient to purchase a thermoplastic machine in case of emergency repairs, especially with the increased footage of thermoplastic being installed each year.

There are arguments pro and con about thermoplastic but the fact remains that this is the only line that will last for a full winter on most roadways.

There is no finer looking line than a newly applied thermoplastic line, however after about six months this line levels off in appearance to a point about even with a hot paint line. It will then retain this reflectivity from one to about eight years depending on location.

### COLD APPLIED THERMOPLASTIC

The Department purchased 200 gallons of a cold applied thermoplastic. This will be applied in Fiscal 1972 and is supposed to give a minimum of three years of acceptable durability. This plastic is a European - American product that has had marked success in one of the Mediterranean countries.

### VARIABLE SPACING OF TRAFFIC LINES

One of the most significant experiments this past year was one that got little publicity or little notice from the traveling public. The project consisted of lengthening spacing between white lines from 25 feet to 40 feet. This increased spacing did not bring any comment from the motoring public.

If this spacing were accepted for the high volume highways it would reduce the costs by about 15%. The 15 feet of line and 25 feet of space have been widely accepted but at this spacing a line is nearly continuous when travelling at 65 to 70 M. P. H.



## MAINTENANCE SECTION

### CONTRACTS

There were significant changes in the Contract Pavement Marking Field during Fiscal 72 the contracts totaled as follows:

1. There were 20 each one year contracts which called for a certain number of applications of a hot paint.
  2. There were six each two year contracts issued which called for a certain number of paintings of a hot paint during the two year period. By issuing two year contracts and scheduling the award of the contracts for every other year the paper work involved in processing yearly contracts is significantly reduced.
  3. There were two each two year contracts issued which are called Performance Contracts. These contracts have aroused much interest throughout the Country. These contracts stipulate that the Contractor has a certain section of the highway to maintain for a period of two years after the initial application. The applied Safety Lines must be maintained in a condition that will be equal to or better than the minimum reflectivity standard which is located at the Research and Materials Lab in Wellesley.
- The Contractor may use any material he wishes (within reason) for the Performance Contract as long as the line is maintained in good condition.

The performance lines are inspected from time to time and, if they do fall below the standard, the Contractor is penalized by a monetary deduction from monies owed him.

Routine payments consist of periodic percentage payments through the life of the Contract.

In Fiscal 1972 it is proposed that most safety line contracts will



## MAINTENANCE SECTION

### CONTRACTS (Cont'd)

be of the Performance type.

### CONTRACT PRICES

In Fiscal 1971 one more contractor joined in the bidding for safety line applications, bringing the total of serious bidders to three and they continued the reduction in the unit price for safety line painting. In 1969 the price averaged \$0.0315 per foot, in 1970 the price averaged \$0.0288 per foot and in 1971 the price averaged \$0.0198 per foot, i.e., a reduction of 35% in price over the last three years.

Thermoplastic prices for contract work have also been coming down from the high of 40¢ to 45¢ of three years ago. The bidding for this work is coming in around 28¢ per foot now, or a drop of about 30% in three years.

### EQUIPMENT

#### HOT PAINT MACHINE

The Department became fully operational in the rapid curing pavement marking area thru the recently purchased Hot Paint machine. This machine was placed in a District where there is no Contract Painting and after a short adjustment period the District found increased production over the cold paint application. The Hot Paint machine gives the Department the flexibility to handle emergency operations even under certain adverse weather conditions.

### EARLY PAINTING

By insisting that the Districts get out and stripe the highways as soon as possible the motorists had lines much earlier than usual in the



## MAINTENANCE SECTION

### EARLY PAINTING (Cont'd)

spring of 1971. There were very few periods of "no-line" performance on the State Highways last year. It is most important that the spray painter working foreman be assigned to the Traffic Maintenance Sections on a permanent year round basis rather than on a seasonal basis. The State of the Art in Safety Line Application demands year round activity.

### SIGNAL MAINTENANCE

The updating of traffic signals to bring them into compliance with the Federal Standards dropped to a new low this year as no funds were appropriated for the program. By using various accounts as permitted by the Accounting Section a total of 9 signals were rebuilt at an average cost of \$20,300.00. When the updating program started in 1966 the average cost of rebuilding was \$4,085.00. The costs have continually increased from that time until it required \$8,500.00 to rebuild a signal last year. To date 168 of 541 signals have been updated.

This year 8 new traffic signals were installed at an average cost of \$11,000.00. The number of new installations usually falls between eight and ten per year.

A total of three force account signal projects were completed in Fiscal 1971 at a cost of \$3,700.00.

A new phase of signal maintenance was instituted this year, painting by contract. This work also includes washing the lenses, cleaning the reflector and repairing the concrete signal base when required. In district six 38 traffic signals and 27 flashing warning beacons were painted for approximately \$9,000.00.





## MAINTENANCE SECTION

### SIGNAL MAINTENANCE (Cont'd)

Signal maintenance problems have decreased significantly since the change-over to solid state signal controllers. It takes something as drastic as a lightning bolt spike entering through the power line or a knock-down by a motor vehicle to cause the hundred odd S.S. controllers to fail. The Traffic Signal Electricians have gotten over their initial fear of transistorized equipment and now appreciate the new type controllers. Maintenance problems consist mainly of knock-downs, detector loop failure and the ever present vandalism.

### SAFETY LIGHT MAINTENANCE

Each year more and more lighting units are added to the work load of the already over-worked Electricians. An effort has been made to ease the maintenance of street lights by resorting to contract work. Three contracts have been awarded in Districts three and six to clean and repaint the standards, wash the refractors, clean the reflector and repair the cement concrete base of 782 units.

As more lighting units are added to the Highways of the Commonwealth either one of two things has got to come about to protect this investment. Either the Department must employ more electricians or the maintenance must be let out to contract. Either way it will require increased maintenance funds and those directly concerned with this funding should be fully aware that right now Maintenance cannot adequately maintain the existing safety lighting.

A glimmer of hope is on the horizon - Tower Lighting. No special equipment is required for maintenance of these units, luminaries lower to the ground for servicing.



## MAINTENANCE SECTION

### SAFETY LIGHT MAINTENANCE (Cont'd)

As in years past the Traffic Signal Maintenance Engineer worked in close contact with the signal personnel of the Traffic Engineering Section and with the Traffic Electrician Foreman at Wellesley. It is only through the diligence of this group with their specialized skills that the Commonwealth maintains its high position of competence in the electrical phase of Traffic Activities.

Should laxness invade this very vital area, the consultants, the manufacturers and the suppliers could virtually rape the Commonwealth with electronic wizardry.

### STRUCTURES MAINTENANCE

#### BRIDGES

As of July 1, 1971, the Department had maintenance responsibility for a total of 2,010 bridges, having a total work load area of approximately 2,399,900 square yards. This compares to 1,977 bridges and a work load area of 2,375,300 square yards maintained a year ago.

The Department shows maintenance responsibility on 130 bridges over various railroads which are included in the total.

The Department had Operations and Maintenance responsibility for nineteen (19) Drawbridges located over navigable waters.

#### LOCATION OF DRAWBRIDGES

#### OPENINGS DURING FISCAL 1971

Amesbury-Deer Island Bridge over Merrimack River	69
Beverly-Salem, Route 1A over Danvers River	889
Beverly-Salem, Kernwood Avenue over Danvers River	990
Beverly Hall Whitaker Bridge over Bass River	23



MAINTENANCE SECTION

STRUCTURES MAINTENANCE

BRIDGES (Cont'd)

Gloucester, at Blynman Canal Route 127 over Annisquam River	7668
Haverhill-Groveland, Route 97 over Merrimack River	12
Haverhill-West Newbury Rocks Bridge over Merrimack River	13
Newbury, Plum Island Turnpike over Plum Island River	190
Salisbury-Newburyport, Route 1 over Merrimack River	1019
Braintree, Weymouth Landing, Route 3 over Monatikquot River	0
Fall River-Somerset, Brightman Street over Taunton River	1044
New Bedford-Fairhaven, Route 6 over Acushnet River	1676
Quincy-Weymouth, Route 3A across Weymouth Fore River	565
Westport Point, Route 88 over Westport River	44
Scituate-Marshfield, Route 3A over North River	11
Tisbury-Oak Bluffs, Beach Road over Lagoon Pond on Martha's Vineyard Island	340
Boston-Milton, Granite Avenue Route 3 over Neponset River	780
Cambridge, Commercial Avenue over Lechmere Canal	131
Lynn-Saugus, Western Avenue over Saugus River	2200
TOTAL OF ALL OPENINGS	<u>17664</u>



MAINTENANCE SECTION

CONTRACT MAINTENANCE PROJECTS

The following 15 bridges were painted under 12 contracts:..

<u>CITY OR TOWN</u>	<u>LOCATION</u>	<u>COST</u>
Huntington	Rte. 112/Westfield River	\$11,700.00
North Adams	Rte. 8/Hoosac River	4,800.00
Agawam-Springfield	Rte. 5/Corn. R. & Penn. C.R.R.	126,600.00
Agawam-W. Springfield	Rte. 5/Westfield River	10,860.00
Townsend	Rte. 119/Squannacock River	1,840.00
Lowell	Bridge St./Merrimack River	32,600.00
Gloucester	Rte. 128/Annisquam River	69,100.00
Stoughton	Rte. 139/Rte. 24	8,034.00
Avon	Pond St./Rte. 24	6,834.00
Braintree	Washington St./Rte. 3	
	Washington St./Penn. R.R.	
	Roadway A/Rte. 3	
	Elm St./Rte. 3, Penn. R.R. and City Streets	12,998.00
Boston	J. F. Fitzgerald Expressway and ramps	88,750.00
Boston	Savin Hill Ave./S.E. Expressway and MBTA	6,245.00
	TOTAL COST	\$380,361.00

CONTRACT MAINTENANCE PROJECTS

<u>CITY OR TOWN</u>	<u>LOCATION</u>	<u>WORK</u>	<u>COST</u>
Oak Bluffs-Tisbury	Beach Road over Lagoon Pond	Operation and Main- tenance of Drawbridge	\$ 3,225.00
Boston	J. F. Fitzgerald Expw./Charles R.	Grouting Stones masonry piers	3,740.00





MAINTENANCE SECTION

CONTRACT MAINTENANCE PROJECTS (Cont'd)

Weinham	Grapevine Road/ Rte. 128	Bridge Accident Repairs	26,708.00
Beverly-Salem	Kernwood Ave. also Rte. 1A/Danvers R.	Fender Repair and Dolphin Improvements	110,220.00
Amesbury, Andover Haverhill & Methuen	Bridges on Rtes. 495, 93 & 213	Repair Slope Pavings Under Bridges	24,955.00
Boston	S.E. Expressway at Mass. Ave.	Structural Bridge Repair	67,920.00
Lowell and Chelmsford	Bridges on Rtes. 495 & 3	Repairing Slope Paving under Bridges	10,410.00
Boston and Vicinity	State Highways	Electrical Mainten- ance Services	18,140.00
TOTAL COST			\$265,318.00

CONTRACT BETTERMENT PROJECTS

Wilmington	Rte. 129/I-93	Latex Modified Cement Concrete Overlay	\$ 32,000.00
Quincy- Weymouth	Drawbridge Rte. 3A/Fore River	Corrections Counter Weights	40,690.00
Boston	Savin Hill Ave./ S.E. Expressway	Installing Wind Barrier on Bridge Rails	6,121.00
Westfield	Rte. 20/Westfield R.	Waterproof and Resurface	49,871.00
Great Barrington	Rte. 7/Green R.	Waterproof and Resurface	22,550.00
Orange	Rte. 2/Rtes 122 and 202	Deck Improve- ments	46,220.00
Somerset- Swansea	Rte. 195 (3 Bridges)	Deck Joint Repair	35,779.00
TOTAL COST			\$233,231.00



## MAINTENANCE SECTION

### EXPERIMENTAL WORK

As in previous years the Structures Maintenance Unit continued with experimental work with the cooperation of the Research and Materials Section in Wellesley.

Several new installations of membrane waterproofing using Uni-Royal Liquid Membrane, a product of Uniroyal, Inc., were placed on the South-east Expressway bridges in conjunction with the resurfacing of the roadway. These bridges were Victory Road, Willard Street, Furnace Brook Parkway and Route 3 in Kingston over the Jones River. This membrane a hot rubberized asphalt compound applied at a thickness of approximately 150 mils still looks very promising as a good membrane. However, further evaluation is necessary before final conclusions.

A project involving four (4) bridges on Route 24 in Brockton and Avon was set up as an experiment in the use of epoxy thin overlays. Two bridges, both on the south bound roadway were to be an epoxy application with the aggregate broadcast onto the wet epoxy and the other two bridges were to be a epoxy mortar overlay of 1/4 inch to 3/8 inch in depth. Due to weather conditions only two were completed during the 1971 Fiscal Year and the other two will be completed during the Fiscal Year 1972.

The two completed bridges were as follows:

Brockton - Route 24 over Oak Street - South bound

Material - Sika-Colma Dur  $\frac{1}{2}$  of the bridge

Surface Kote  $\frac{1}{2}$  of the bridge

Manufacturer - Sika Chemical Corporation  
Lyndhurst, New Jersey



## MAINTENANCE SECTION

### EXPERIMENTAL WORK (Cont'd)

Colma Dur - Prime coat of Colma Dur L.V. applied with rollers at the rate of 150 S.F. per gallon onto existing concrete deck that was prepared by sand blasting. The Colma Dur was then spread with squeegees with the application approximately 30 S.F. per gallon. A quartzite sand was then broadcast by hand onto the wet epoxy until there were no longer any wet spots. Approximately two pounds per S.F. Excess broomed off later.

Surface Kote - No prime coat necessary. Surface Kote applied with notched squeegees to same quantity as Colma Dur. Same sand cover. Material is more chemical resistant than Colma Dur. These materials were placed in October 1970 and to date of July 1, 1971 the Colma Dur is wearing very well but the Surface Kote is showing excessive wear showing no durability.

Avon - Route 24 over South Street - North bound

Material - Celanese Epi Top 100 - Epoxy Mortar

Manufacturer - Celanese Resins  
Louisville, Kentucky

Epi Top 100 - This is an epoxy mortar applied with a vibratory screed to a depth of 3/8 inches over existing concrete deck that was prepared by sand blasting and then heated with infra-red heaters to a surface temperature of 150° F. The deck was then primed with the same epoxy that was used in the mortar using rollers for application at the rate of about 150 S.F. per gallon. The mortar was mixed at a ratio of 5 to 1 by weight of a graded silica sand to epoxy resin. This project was completed in June of 1971.



## MAINTENANCE SECTION

### EXPERIMENTAL WORK (Cont'd)

Work on both of these projects was done by the District 6 Bridge crews.

The other two planned projects are; one using Cono-Crete on the Brockton, Route 24 over Oak Street Bridge, will be done during July, 1971, this is an epoxy mortar overlay, and the second is American Metal Seal Co's - Meta Kote 250 on Avon - Route 24 over South Street Bridge to be done in early August 1971. This is an epoxy overlay that is a broadcast system.

A new product known as Keeper Kote, a one component polyurethane used as a roofing material was tried on the District 4, Arlington Administration Building roof and the District 5, Danvers Administration Building roof with very good results. This material was applied around the perimeter of the roof to stop leaks around and under the flashing. This product is still being evaluated and looks very promising as a good roofing material.

A new method for the control and elimination of birds from under the Quincy - Weymouth, Fore River Bridge was tried. The product name is Rid - A - Bird and is a toxic contact poison known as fenthion. Application can only be made with permission of the Pesticide Control Board. Approval of this project was received from the Department of Natural Resources and the U.S. Division of Wild Life and Fisheries. The material was applied by spraying and paint rollers to the structural steel and a few perches with reservoirs and wicks were installed. The





## MAINTENANCE SECTION

### EXPERIMENTAL WORK (Cont'd)

viscosity of the liquid was increased by adding petroleum jelly when applied with the paint rollers. Approximately 200,000 birds were eliminated. However there still remains approximately 200,000 to 300,000 birds to be eliminated this coming year. This project was considered very successful.

### BUILDING MAINTENANCE

The construction of foreman's garages continues to be an activity of high priority.

A new metal foreman's garage was constructed in District 8 in Revere and is nearly completed and ready for occupancy this summer. The contractor was DeIulis Bros. Inc. and the cost was \$160,900.00.

New plans have been drawn with specifications for a more permanent type of garage constructed of masonry that is also wider than the old garages so that all the equipment of a section may be stored under cover. At present there have been three of these garages advertised with contracts awarded and two are under construction with the third soon to follow. The locations are as follows; Milton - under construction, Pittsfield - under construction and Orleans - construction to begin in August 1971. The average cost of these garages is about \$260,000 each. It is hopeful that the construction of foreman's garages will be a continuing activity.

District 4 - Arlington Administration Building's Roof Repairs was advertised and a contract awarded to Cormier Construction Co. for the amount of \$25,998.00. Work is under construction and expected to be completed in August 1971.



## MAINTENANCE SECTION

### BUILDING MAINTENANCE (Cont'd)

District 4 -- Arlington Administration Building Heating System Renovation and Alterations was designed by a consultant Frank E. Gallagher & Associates, advertised for construction and a contract awarded to J. A. Marino Automatic Heating Co. for the amount of \$38,882.00. Work is expected to be completed by early fall.

Maintenance with minor repairs being made to buildings as they are needed is a continuing function of the Districts with District personnel.

Several heating installations were converted from using heavy residual fuels to cleaner burning fuels to meet environmental regulations and were as follows:

District 1 - Administration Building

District 5 - Administration Building

District 8 - Administration Building

District 8 - Charlestown Garage

### CIVIL DEFENSE

1. Provided full time assignment to the State Civil Defense Agency as required. (Sect. 3, Executive Order #25)

2. Approximately one third of the radiological monitors and instructors assigned a civil defense mission have had refresher courses.

3. Emergency Highway Traffic Regulation Emergency Operation Simulation training has been held in five Districts.

4. Arranged for a one day workshop for DPW personnel on damage effects estimation techniques at the Federal Civil Defense Center in Maynard, Mass.



## MAINTENANCE SECTION

### CIVIL DEFENSE (Cont'd)

5. a-Prepared a Fire and Evacuation Plan for the DPW main office.  
A Safety and Security plan is being prepared.  
b-Arranged for a physical security survey for the DPW main office.  
c-Plans for the protection of the Departments vital records are being established.
6. Coordinated Public Law 99 assistance as it pertains to Chapter 595 of the Massachusetts Laws. (Maintenance and safety of dams.)
7. a-Revised the DPW-CD table of organization  
b-Arranged for the exchange of all radiological instruments assigned to the DPW.
8. Arranged for Federal funds to defray the cost of initial plans for an emergency generator for 100 Nashua Street.
9. Arranged for the use of the State pumps for emergency conditions various towns.
10. Attended a flood emergency exercise sponsored by the Corps of Engineers in Adams and North Adams.
11. Prepared maps and reports for the Director MCDA on potential flooding areas in the State.
12. Established lists of current municipal and State emergency construction equipment and supplies.

### SNOW AND ICE CONTROL

Snow removal on State Highways is carried out under authority of Section 19, Chapter 81, of the General Laws as amended.

During the 1971 Fiscal Year the Department plowed and treated with spread chemicals 9,395 lane miles of State Highway.



## MAINTENANCE SECTION

### SNOW AND ICE CONTROL (Cont'd)

Snow removal on Town roads is carried out under the authority of Section 11, Chapter 83, of the General Laws. During the year, the Department cooperated in plowing 475 linear miles of Town Highways. Under the Act, the highways selected were plowed in cooperation with the Town with 50% of the cost being borne by local agencies.

Snow and Ice Control activities include: Responsibility for proper performance of plowing snow, spreading sand and chemicals, erection of snow fences, the clearing of waterways, winter patrolling of the highways, removal of snow from bridges, loading and hauling of snow from certain structures and the clearing of signs and signals. The Snow and Ice Control Section is also responsible for the post season contracts to clean highways and catch basins, the acquisition and improvement of Maintenance Areas and the system of fog warning on highways.

The program for providing industrially pre-mixed sodium and calcium chlorides has continued to improve. In Fiscal Year 1971, the Chemical Corporation supplied 35,802 tons based on a contract for 36,000 tons in the ratio of five parts sodium to one part calcium (by weight). The cost was \$21.925 per ton. The material blending and its use have been decidedly enhanced through added experience.

The construction of chemical storage sheds continued with an appropriation of \$300,000.00 from the Legislature. A proposal was advertised for contract construction of sixteen (16) 40 feet wide by 84 feet long, two in each District, with the inner buttress wall additionally supported by angular side braces to the outside and into thrust blocks. Their intended capacity was well over 1,000 tons each.





MAINTENANCE SECTION

SNOW AND ICE CONTROL (Cont'd)

Bidding in December was good but, with the average bid price of \$20,800.00 each, only fourteen (14) could be awarded. The balance of monies in the account, plus other funds available, allowed provision of bituminous concrete floors and loading pads our front for each shed. All fourteen sheds were completed in June and are ready for summer chemical intake. As rapidly as further funds are made available for this purpose, this type of construction will be prosecuted. The program will require an overall of \$4,000,000.00

Design simplicity at minimum cost to provide maximum functional value appears to have been worked out and a reasonable standard achieved. Such provision is not only to offer maximum protection against ground water pollution at our stockpiles but save as well in prevention of material loss to precipitation, in elimination of polyethylene covers (\$25,000.00 annually) and in affording greater summer intake at lesser purchase price (net \$50,000.00 annually).

The concept of two-year contracts was continued this past year for both highway cleaning and catch basin cleaning. The advantage of this coverage is elimination of one year's complete contract processing, preparation, advertising, award -- since each of the aforementioned was to do the same work, in the same areas, during the same season in each of the two succeeding Fiscal Years. This not only serves the Department's best interest but becomes more attractive to contractors in affording them a year's scheduling in advance and warrant for further investment in their equipment. The concept worked well, with a minimum of problems.



## MAINTENANCE SECTION

### SNOW AND ICE CONTROL (Cont'd)

The defense against dense fog's sudden development on high speed highways leading to multiple accidents has been advanced by improved warning systems. The Department's meteorological consultant, Weather Services, Inc., of Bedford, still has written into their contract provision for such forecasting in addition to their usual forecasting services and agreement has been reached with the State Police for observation pursuant to warnings of potential fog development. Department forces are then alerted for placement of warning devices as conditions deteriorate. It is an initial approach toward a serious but somewhat indefinite set of weather phenomena which will depend mainly on improving forecasting techniques.

The Storm Emergency Center's Communication with the several State Agencies and surrounding Cities and Towns during the past winter was comparatively quiet. During the prior three (3) winters, this media, established to facilitate access to and exodus from the core city, was used effectively on many occasions. Last winter can best be characterized as very severe, an almost continuous sequence of smaller storms (30 average State-wide), with a high frequency of freezing and thawing cycles, plaguing the highway crews and motorists. None were sufficient to incur extensive tie-ups but were of the size and low-temperature variety that cause extensive chemical outlay and must be classified as expensive.

The Snow and Ice Control Engineer is a member of the Highway Research Board Committee on "Snow and Ice".



## MAINTENANCE SECTION

### ROADSIDE MAINTENANCE

Activities carried on under the Maintenance Section Roadside Development Unit during Fiscal 1971 consisted of Contract Tree Planting, Tree Trimming, Mist Blower Spraying, Mowing of Grass, Removal of Trees and Stumps and Travel Trash Collection, Normal Force Account Roadside Maintenance activities, such as Brush Control for Safe Sight Distance, Vista Clearing, Selective Clearing and Trimming, Rest Area and Truck Turnout Improvement and Maintenance, Drainage Ditch Clearance, Emergency Tree Removal and Trimming along with Litter Pickup, were carried on in all Districts.

The Cooperative Research Program, sponsored jointly, by the Massachusetts Department of Public Works, Bureau of Public Roads and the University of Massachusetts, Department of Plant and Soil Sciences of the College of Agriculture has produced and is continuing to produce demonstrative results. Various experimental slope plantings of Evergreen Seedlings, Crownvetch and Sweetfern have been made in all Districts, using plant material grown at the University and collected sods and rhizomes of Sweetfern to solve our problems of soil erosion and expensive mowing requirements. With the use of growth chambers, the personnel of this program is working on methods to artificially break the dormancy of seeds, thereby reducing the cost of plant materials to be used on our slopes.

The Highway Landscape Supervisor, in the capacity of Technical Advisor to the Research Program, is able to direct efforts in the field of combating erosion through planting material in the various environments



## MAINTENANCE SECTION

### ROADSIDE MAINTENANCE (Cont'd)

of the State. He is also representative of the Commissioner on the State Pesticide Board and in this position has access to first hand knowledge of desirable and undesirable chemicals used in destruction of harmful insects, weed control and soil sterilization along with instructions in their safe usage.

Budgetary assignments were insufficient to provide complete programs in Hydraulic and Soil Sterilant Spraying and Plant Fertilization. Both are desirable programs in Roadside Maintenance. Unfortunately, funds were not adequate to accomplish all of this work. Elimination of weed growth keeps the necessity for mowing at a minimum. Healthy roadside growth is a deterrent to soil erosion and additional funds should be made available to accomplish roadside fertilization in the coming year.

Tree trimming was performed in six (6) Districts during Fiscal 1971 and seven (7) contracts in seven (7) Districts are being advertised for Fiscal 1972. For Fiscal Year 1972 only \$90,000.00 has been made available for tree trimming. This will allow us to accomplish seven (7) out of fifteen (15) needed contracts, thus leaving \$250,000.00 worth of normal State-wide Tree Trimming requirements unfulfilled. Our Tree Trimming Program and funds for it are insufficient. Overtime payment for removal of dangerous branches felled by storm would nearly pay the cost of comprehensive and complete annual Tree Trimming Program.





## MAINTENANCE SECTION

### ROADSIDE MAINTENANCE (Cont'd)

Other roadside responsibilities of the Maintenance Section are listed as follows:

#### TREE PLANTING

7,944 hardwood, shade, evergreen and flowering trees and shrubs, along with 74,033 seedlings and lining out stock were planted on various State Highways under eight (8) contracts. The seedling and lining out planting is part of our relentless struggle to control erosion and to reduce mowing areas.

<u>DISTRICT</u>	<u>TREES AND SHRUBS</u>	<u>SEEDLINGS AND LINING OUT</u>	<u>CROWN VETCH</u>	<u>ALLOTMENTS</u>
1	925	3200	1000	28425
2	827	5250	1000	22200
3	845	8300	2000	35962.50
4	1150	12100	3200	26467.50
5	516	21800	2000	31345
6	1415	6540	(1-Seed) 1000	28474.50
7	1451	13843	1865	33697.11
8	815	3000	(1-Seed) 300	20212.50
	<u>7944</u>	<u>74033</u>	<u>12365</u> (2 Acres Seed)	<u>226784.11</u>

#### MIST BLOWER SPRAY FOR SUPPRESSION OF DUTCH ELM DISEASE

This work was accomplished on a State-wide basis under seven (7) individual contracts at a cost of \$43,576.50. Spraying for suppression of Dutch Elm Disease is a mandate of the laws.

#### HYDRAULIC SOIL STERILANT AND SPRAYING

No funds were provided for this very necessary program that has such a beneficial effect on the health and safety of the public we serve.



MAINTENANCE SECTION

ROADSIDE MAINTENANCE (Cent'd)

MOWING OF GRASS ALONG STATE HIGHWAYS

In an attempt to have tighter control over mowing operations, the work was broken down into one hundred-one (101) contract, one for each Repair Section with the Repair Foreman responsible for mowing in his Section. There seems to be a definite improvement in the quality of the work under this system. The ever increasing area of roadsides requiring mowing forebodes higher costs which can only be reduced or minimized by a positive program of mulching and planting for the dual purpose of erosion control and cost reduction.

The work is being accomplished under one hundred one contracts along 2,742 miles of highway at a cost of \$701,270.00.

<u>DISTRICT</u>	<u>NO. OF CONTRACTS</u>	<u>MILES</u>	<u>COST</u>
1	7	276	
2	11	382	
3	17	462	
4	17	381	
5	12	268	
6	19	432	
7	15	484	
8	<u>3</u>	<u>57</u>	\$701,270.00
TOTAL	101	2742	



MAINTENANCE SECTION

ROADSIDE MAINTIENANCE (Cont'd)

REMOVAL OF TREES AND STUMPS

Dead, diseased and dangerous trees are removed in the interest of highway safety and to promote health in existing desirable roadside growth. This work was accomplished on a State-wide basis for removal of 3,045 trees under fifteen (15) contracts at a cost of \$224,706.74.

<u>DISTRICT</u>	<u>NO. OF CONTRACTS</u>	<u>TREES REMOVED</u>	<u>ASSIGNMENTS</u>
1	2	632	\$ 55,145.00
2	2	492	47,388.00
3	3	508	40,498.00
4	3	513	27,203.00
5	2	419	23,032.74
6	1	244	16,584.00
7	1	193	13,535.00
8	<u>1</u>	<u>44</u>	<u>1,321.00</u>
TOTALS	15	3045	\$224,706.74

TRAVEL TRASH COLLECTION

Thirteen contracts were awarded for the collection and disposal of travel trash along 450 miles of State Highway. Ten contracts call for the emptying of a total of 975 Department-owned travel trash barrels and three contracts required the contractor to furnish 54 containers, serviced by packer type disposal trucks. The cost is much less than would be the cost of doing this work with Department personnel and equipment.



## MAINTENANCE SECTION

### ROADSIDE MAINTENANCE (Cont'd)

#### PREVENTIVE ROADSIDE MAINTENANCE

With each mile of new highway being accepted by the Department the acreage of roadsides increases by about twenty-seven acres, most of which, on slopes is seeded to grass. The master plan for developing preventive maintenance into over 50,000 acres of land that abuts the 2,800 miles of State Highway, which was originated several years ago, is still being pursued through the mulching and planting of many areas, State-wide, with over 30 species of hardy seedlings, shrubs, ground cover, natural growth sods and trees, contingent upon the availability of funds. When the ecology is right, natural growth is induced to fill in the planted area to present naturalistic roadsides.

Our planting is to effect economy in Highway Maintenance. Grassy areas requiring several mowings annually are being transformed into naturalistic roadsides with built-in erosion control.

Attractive roadsides will encourage greater numbers of tourists who uplift our State's economy through the expenditure of over a billion dollars annually.

#### SELECTIVE CLEARING AND BRUSH REMOVAL FOR SIGHT DISTANCE

No funds were provided to accomplish this work which is directed to highway safety by opening sight distance and exposing background views to the motorist. It is recommended that this work be pursued.

#### DITCH CLEARANCE

Obstructions to flow in drainage ditches contribute to soil erosion along our highways and inefficient flow of drainage system discharge.





## MAINTENANCE SECTION

### ROADSIDE MAINTENANCE (Cont'd)

#### DITCH CLEARANCE (Cont'd)

This year, District forces will spray vegetation existing in ditches. Current obstructions in ditches should be cleared away under contract as our 1,400 miles of ditches will be too much to ask our already undermanned personnel to attempt along with their other necessary duties.

### CONSTRUCTION OF ROADSIDE REST AREAS

Modernization of existing rest areas and the critical need of construction of new facilities is considered essential in promotion of travel. Many of our existing rest areas are currently being used beyond a practical capacity.

Certain locations, State-wide, were selected for Roadside Rest Area Construction under President Johnson's Beautification Program. It is apparent that no funds will be forthcoming under this program and other arrangements must be made to provide these critically needed areas as soon as possible.

Recent field observations indicate that we do not have a sufficient number of Rest Areas on some routes. The existing facilities are being put to near capacity use by drivers of both passenger cars and trucks. Weekend observations noted double the usage and a definite lack of sufficient facilities.

Land values are rising rapidly, particularly near new expressways. Further delay in obtaining land and designing areas will make for high cost in future construction. Action should be taken now.



## MAINTENANCE SECTION

### ROADSIDE MAINTENANCE (Cont'd)

#### CONSTRUCTION OF ROADSIDE REST AREAS (Cont'd)

The use of existing facilities of Rest Areas in many instances has reached the saturation point. Because of the danger to the public health, the installation of Sanitary Facilities of some sort should be made regardless of the inevitable high cost of maintenance which could be from \$15,000 - \$30,000. per Rest Area for one year.

With the limited personnel now available for Maintenance, it is even now impossible to maintain these "Areas" properly.

If permanent sanitary facilities are installed, a separate, continuing fund must be set aside to assure a satisfactory complement of personnel.

#### MAPS AND STATISTICS UNIT

This unit maintains statistical data on all State Highways, such as length, width, thickness of pavement shoulders and foundations, year built and whether built under construction, reconstruction or resurfacing projects.

Maintenance expenditures, cost comparison and analyses are prepared by this unit as required by the Department.

The maintenance costs are reported by District and Activities. A cost per lane mile of each item is also shown.

Bridge and Highway Coding numbers are set up by this unit.

All Highway data has been set up in the electric computer and breakdown of the data can be obtained as required for Department use.

All Districts are supplied with a tabulation of the State Highway by Repair Sections and broken down into Highway Routes, Towns, Types, width lane and linear miles, etc.



MAINTENANCE SECTION

MAPS AND STATISTICS UNIT (Cont'd)

The Snow and Ice Control Schedule and maps are prepared in this office.

REGULATORY PERMITS - JULY 1, 1970 ----- JULY 1, 1971

During the year the following permits were issued by the Boston Office:

	<u>No. of Permits</u>
Heavy Equipment, House Trailers and Buildings	22,343
Utilities	538
Driveways	<u>141</u>
Total	23,022

During Fiscal Year 1971, 6,675 permits have been issued via telegram.

From October 2, 1970 to July 1, 1971, 3,528 permits have been issued via Transceiver.

EQUIPMENT

The following Equipment was purchased during Fiscal Year 1971:

NEW EQUIPMENT

- 12 Pickup Trucks - 6 Man Cab
- 5 Rotary Snow Trucks
- 18 Automatic Sanding Bodies
- 2 Truck Mounted Pavement Marking Machines
- 5 Snow Units
- 8 Heating Kettles
- 5 Automatic Sander Bodies



## MAINTENANCE SECTION

### EQUIPMENT (Cont'd)

#### REPLACEMENTS

- 12 Sander Bodies
- 80 Snow Plows
- 1 Four Wheel Drive Jeep
- 18 Generators
- 4 Paint Conditioners
- 56 Two Wheel Drive Dump Trucks with Automatic Sander Bodies
- 20 Chipping Hammers
- 1 Roller
- 8 Pavement Markers
- 1 Electric Test Bench
- 2 Welding Machines
- 7 Sewer Cleaners
- 3 Striping Machines
- 3 Tar Kettles
- 16 Stake & Rack Trucks
- 8 Concrete Mixers
- 14 Compressors
- 20 Chain Saws
- 10 Snow Units
- 1 Pavement Marking Machine
- 2 Air Drills
- 6 Air Hammers
- 7 Pumps

The following Equipment was set up and purchased:

#### RADIO

- 1 Coaxial Antenna
- 1 Frequency Meter
- 2 Communication Receivers
- 12 Monitor Receivers
- 28 Mobile Radio Units
- 2 UHF Load Resistors
- 1 D.C. Power Supply
- 1 Metering Panel
- 1 Signal Generator





MAINTENANCE SECTION

TWO-WAY RADIO COMMUNICATION

The Department's Two-Way Radio Communication Network licensed by the Federal Communications Commission and operated and maintained by Maintenance personnel in accordance with the provisions of Part 89 of the Commission's Rules, regulating conduct of the Highway Maintenance Radio Service, continued to provide an efficient means of communications during the routine and emergency activities of the Department during the year.

At the present time the network consists of the following units:

- A. 1 Monitor Control Station
- B. 10 District Base Stations
- C. 5 Microwave Links with Related Terminals
- D. 8 Auxiliary Base Stations
- E. 6 Auxiliary Civil Defense Stations
- F. 2 Emergency Portable Stations
- G. 386 Mobile Stations in Cars and Trucks
- H. 14 Citizen's Band Portables and related "Walkie Talkies"

Upon recommendation of communications personnel of the Department and under the supervision of the Maintenance Engineer the program of preventive maintenance applicable to fixed radio installations was continued and a program of replacement of base and mobile units was implemented whereby compact transistorized equipment is replacing tubed dual unit mobiles and solid state equipment is replacing tubed base station equipment as far as budgetary limitations will permit. There is every indication that savings in material and labor will offset initial costs.

A final "phase out" date of the old equipment has been set as Fiscal 1975 but there is every indication that it can be accomplished before that time.



## MAINTENANCE SECTION

### TWO-WAY RADIO COMMUNICATIONS (Cont'd)

Plans have also been made to provide new mobile equipment for new positions in the ever expanding highway maintenance program.

In accordance with the Maintenance Engineer's policy of streamlining and implementing communications, a modification was made in the existing Station at Turkey Hill in Arlington, Massachusetts, thereby giving District 8 access from three (3) control points to a new transmitter and two (2) receivers at that location via land lines. The installation was designed, specified and installed by Maintenance personnel with resulting economies to the Department and gives District 8 much improved communications with supervisory and field personnel on the Northeast and Southeast Expressways, engaged in regular and emergency maintenance programs including the conduct of the highly praised "wrong way" bus operation which depends on accurate and quick communications for its success. Communications Unit personnel coordinated Department communications with State and M.D.C. police vitally necessary to the success of this operation.

In furtherance of the Department's Highway Safety Program this unit provided communications for and assisted in arranging for operation of twenty-two (22) Holiday Highway Motorists' Aid Patrols on limited access highways in Districts 4, 5, 6, 7 and 8 during peak traffic periods on the long Holiday week-ends of Memorial Day, Independence Day and Labor Day.



## MAINTENANCE SECTION

### TWO-WAY RADIO COMMUNICATION (Cont'd)

The purpose of the operation was to relieve Police for enforcement duties by performance of routine and emergency highway maintenance functions.

These operations were successful and appear to have been well received by the travelling public as indicated by favorable comments in Metropolitan and Suburban news media.

Under the direction of the Maintenance Engineer and in coordination with the Snow and Ice Control Engineer and his staff, additional communications equipment was added for use in operation of the Storm Emergency Center, specifically a "hot line" telephone connection with the Massachusetts Turnpike Authority and radio receivers for at home use by supervisory and Snow and Ice Control Headquarters and District Engineering personnel thereby facilitating distribution of adverse weather reports and expediting preparations for coping with storms.

The fog alerting procedure, established as an innovation by the Maintenance Engineer and the Snow and Ice Control Staff, whereby the State Police are informed via teletype by the communications unit of possible fog problems on State Highways based on best available forecast data and upon receipt of confirmation from the State Police of the development of a foggy, hazardous driving condition, the Maintenance Engineer or certain designated alternates alerts State Forces via the Communications Unit to take appropriate warning action in the foggy areas thereby safeguarding the travelling public, continued in operation throughout the year.



MAINTENANCE SECTION

TWO-WAY RADIO COMMUNICATIONS (Cont'd)

In compliance with the requirements of the Federal Communications Commission, schedules and tabulation sheets were prepared and vehicular movements were coordinated in the conduct of the annual frequency measurements on mobile radio units. Arrangements were also made for frequency measurements on Department Stations through a Contract with the Cambridge Thermionic Laboratory in Cambridge. This assured certified primary frequency measurements of all base stations acceptable to the F.C.C. and provided positive assurance against "drifts" into other assigned areas of operation. Specifications were also prepared and test equipment procured enabling the Radio Repair Men to supplement the primary measurements with their own and to keep the need for the primary measurements at a minimum.

The Aforesaid radio maintenance personnel continued to perform preventive maintenance and emergency repairs on Department radio equipment with priority being given to base station operations. "Outs" and operating costs were kept at a reasonable minimum.

In accordance with Legislative Mandate and Department Policy the two-way radio network of this Department was coordinated with the State and Federal Civil Defense Agencies. Consultation was also held with the Department's Liaison Engineer and M.C.D.A.'s Warning Officer on improvement in the teletype connection with State Police Headquarters which is the State Agency charged with the responsibility for disseminating Local and National Warnings on a First Priority Basis and with an interconnection with the National Warning Headquarters in Colorado.





MAINTENANCE SECTION

TWO-WAY RADIO COMMUNICATIONS (Cont'd)

It is noted that the Maintenance Division has had the forethought to maintain the Receiver Set on the State Police frequency thus expediting trouble calls on maintenance problems on the Highway in general and giving a three (3) way capability on handling of Civil Defense messages, i.e., telephone, teletype and radio.

Assistance was provided by the Maintenance Communications Unit in the preparation of radio maintenance and repair contracts in order to insure uninterrupted communications to the Districts by assuring the services of a reputable contractor in each District in accordance with the provisions of Chapter 29, Section 8A of the Massachusetts General Laws.

Representation was provided by the Communications Unit at Meetings called by the Department of Natural Resources for the purpose of consolidating certain microwave facilities of this and other State Agencies on Mount Wachusett in Princeton, Massachusetts in one highly secure and modern transmitter housing. Because of the many adaptations to the various Agencies' requests progress in this matter is slow but an estimated date of 1975 for this desirable change-over appears reasonable at this time.

Representation was also provided at Meetings called by A & F for the purpose of determining the feasibility of installing and making available to all State Agencies a "BackBone" microwave system having the capability of providing data fax as well as voice transmission and reception. There was also some discussion of unifying radio maintenance services. These discussions were exploratory and of a general nature and no firm commitments have been made to date.



MAINTENANCE SECTION

TWO-WAY RADIO COMMUNICATIONS (Cont'd)

The Department's Auxiliary Civil Defense Network consists of Base Stations licensed to operate on Department Frequencies and located as follows:

1.	State Control	Framingham
2.	Area	1 - Tewksbury
3.	Area	2 - Bridgewater
4.	Area	2 - (Sector 20) West Dennis
5.	Area	3 - Westborough
6.	Area	4 - Belchertown

Mobile operations are conducted by use of the State-Wide Network authorized in the Department's license for the Call Sign KA - 8171 and there is a mobile station for this Department in the Civil Defense Mobile Station van.

The emergency communications net, which was established to provide a liaison apparatus with the United States Bureau of Public Roads and related Federal Agencies in the Boston area for the relay of Federal Defense Conditions messages continued to be maintained on a standby basis.

Two (2) Bureau of Public Roads vehicles previously approved by this Department and authorized by the Federal Communications Commission for operation on our frequency, continued to operate throughout the year. Operation of these vehicles is restricted to emergency communications. There is some indication that because of the infrequent use of these facilities the Bureau may phase out its mobile operation in the Commonwealth.

In accordance with a request from the American Association of State Highway Officials, the Deputy Chief Engineer for Highway Maintenance agreed to serve as Member for Massachusetts on the AASHO Subcommittee on



MAINTENANCE SECTION

TWO-WAY RADIO COMMUNICATIONS (Cont'd)

Communications, whose function is to coordinate applications for frequency allocations in the Highway Maintenance Radio Service and local Government Radio Service with the Federal Communications Commission and other Public Safety Radio Service Committees and users.

While the function of the indicated Subcommittee is advisory and does not bind the Commission or the applicant, the Commission states in its Rules and Regulations that in its absence, proof of notification and concurrence to all co-channel and adjacent frequency users within a radius of 75 miles or a costly engineering survey must be provided with the application. In the course of the fiscal year 1964 applicants availed themselves of this Public Service and were issued letters of comment and recommendation.



**E**





## DIVISION OF WATERWAYS

The Division of Waterways as most recently reorganized under Chapter 821 of the acts of 1963 is a separate Division within the Department of Public Works. Its duties and functions are separate from the so-called Highway Division of the Department and are outlined in Chapter 91 of the General Laws. In addition to the duties and functions as outlined in Chapter 91 of the General Laws, the legislature by means of special legislative acts and resolves authorizes and directs the department of public works through its division of waterways to perform functions that are beyond the scope of Chapter 91.

A list of the chief functions and responsibilities of the Division of Waterways follows:

### UNDER CHAPTER 91

1. The design and supervision of shore protection, harbor improvement and development, stream clearance and flood control projects throughout the Commonwealth. Design is performed either with the Division's own staff or by consulting engineers. Supervision of construction is with our own staff.
2. Issues licenses for structures in certain rivers, tidewaters and great ponds; and permits for dredging. All licenses and permits are issued after a public hearing has been held.
3. Makes field inspections to see that work for which licenses or permits have been granted to comply with plans.



DIVISION OF WATERWAYS

UNDER CHAPTER 91 (Cont'd)

4. In charge of great ponds (over 1300), Commonwealth tide lands, rights in land, flats, shore and tidewaters.
5. Acts as the coordinating agency for Federal harbor development and shore protection projects done on a cooperative basis (i.e. fiscal).
6. In charge of the State Piers at Plymouth and New Bedford and Pilgrim Memorial Park in Plymouth (Plymouth Rock and surrounding area).
7. Leases Fall River and Gloucester State Piers. Makes certain repairs and reconstruction to said piers as authorized by Special legislation.

UNDER SPECIAL LEGISLATION

1. Acts as the contracting agent for the Public Access Board.  
As such represents the Commissioner of Public Works at meetings of the Board. Designs and supervises construction of public boat launching sites approved by the Public Access Board.
2. Acts as the contracting agent for the Department of Natural Resources for the design and construction of recreational facilities such as swimming pools and skating rinks outside the Metropolitan District Commission.
3. Under Chapter 595 of the Acts of 1970, the duties of the County Commissioners relative to the construction, supervision and maintenance of dams and reservoirs were transferred to the Commissioner of Public Works, who has assigned the duties to the Division of Waterways.



DIVISION OF WATERWAYS

UNDER SPECIAL LEGISLATION (Cont'd)

4. The Division in cooperation with the Massachusetts Port Authority; the U. S. Coast Guard; U.S. Army Corps of Engineer; the Mass. Department of Public Health; the Attorney General's Office; and the Boston Harbor Committee on Pollution, is preparing a program aimed toward cleaning up navigational, health, and safety hazards in Boston Harbor and other coastal waters.
5. Under Chapter 870 of the Acts of 1970, a special fund was created to be known as "the Harbors and Inland Waters Maintenance Fund." As of June 30, 1971, no funds were available. However, funds will be available annually starting July 1, 1971, as the amount appropriated is a fixed fraction of the excise obtained from the sale of importation of fuel used in producing or generating power for the operation of watercraft of every description. See section 13 of Chapter 64A of the General Laws.

The work to be done from the monies in this fund consists of the continuous maintenance, dredging, and cleaning of the harbors, inland waters and great ponds of the Commonwealth in order to protect the wetlands of the Commonwealth.

6. The Division of Waterways is the representative for the Commissioner on the following commissions and boards:
  1. Water Resources Commission Monthly
  2. Public Access Board Monthly
  3. Connecticut River Compact Quarterly
  4. Thames River Contract Quarterly



DIVISION OF WATERWAYS

CONSTRUCTION CONTRACTS AWARDED - JULY 1, 1970 TO JUNE 30, 1971

<u>CONT. NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>CONTRACTOR</u>	<u>COST</u>
2681	Barnstable	Dredging	Hydro-Dredge Corp.	\$104,000.00
105-B	Brockton	Skating Rink	Delfour, Inc.	294,000.00
2698	Chatham	Shore Protection	F.V. Lawrence, Inc.	13,000.00
2733	Fall River	State Pier-Bumpers	Ren-Con Corp.	2,000.00
2722	Gloucester	" " Fender	Roy B. Rendle & Co.	17,000.00
		Piles		
2732	Harwich	Marina Floats	P.C.A. Construction	46,000.00
113-B	Haverhill	Skating Rink	D. Antonellis	1,043,000.00
2713	Marblehead	Dredging	Hydro-Dredge Corp	30,000.00
2705	Marion	Shore Protection	Rapoza's Crane Serv.	11,000.00
2711	Marshfield	Sea Wall	Ernest Minelli, Inc.	32,000.00
2710	Marshfield	Bank Protection	Ernest Minelli, Inc.	22,000.00
115-B	New Bedford	Skating Rink	D. Antonellis	1,088,000.00
2712	New Bedford	State Pier-Scale	Mulholland Constr.	29,000.00
2715	Newburyport	Sea Wall	Ernest Minelli, Inc.	156,000.00
2693	No. Attleboro	Dam Reconstr.	T & T Construction	195,000.00
116-B	Peabody	Skating Rink	D. Antonellis	1,059,000.00
2720	Peabody	Flood Control	R.A. Buccella & Sons	129,000.00
2702	Plymouth	Sea Wall	Gracia Bros	57,000.00
2651	Quincy	Shore Protection	Ernest Minelli, Inc.	20,000.00
2706	Sandwich	Stone Groins	Peter P. Cook	28,000.00
2708	Sandwich	Shore Protection	F.V. Lawrence	29,000.00
67-PA	Sandwich	Boat Ramp & Facilities	Raso Constr. Co.	16,000.00
2714	Scituate	Sea Wall	G. Bonazzoli	75,000.00





DIVISION OF WATERWAYS

CONSTRUCTION CONTRACTS AWARDED JULY 1, 1970 TO JUNE 30, 1971 (Cont'd)

<u>CONT. NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>CONTRACTOR</u>	<u>COST</u>
2682	Southbridge	Stream Improvements	Northeastern Constr.	\$ 38,000.00
106-B	Springfield	Skating Rink	Joseph Orwat	355,000.00
2709	Tisbury	Shore Protection	Campanella Corp.	22,000.00
2726	Wakefield	Stream Improv.	Wales Corp.	127,000.00
2707	Wareham	Dredging	No. Atlantic Dredg.	170,000.00
66-PA	Winthrop	Boat Ramp & Facilities	Vitale & Sons, Inc.	159,000.00
2727	Winthrop	Shore Protection	R.L. Spencer	24,000.00
107-B	Worcester	Skating Rink	Granger Bros.	<u>277,000.00</u>
			TOTAL	\$5,665,000.00



DIVISION OF WATERWAYS

CONSTRUCTION PROJECTS COMPLETED - JULY 1, 1970 TO JUNE 30, 1971

<u>CONT. NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>CONTRACTOR</u>	<u>COST</u>
2698	Chatham	Shore Protection	F.V. Lawrence, Inc.	\$ 12,963.00
2686	Chatham	Dredging	No. Atlantic Dredging	110,043.00
2658	Fairhaven	Drainage	Gerald M. McNally	66,787.00
2684	Fall River	Pier Repairs	Harbor Constr., Inc.	17,133.00
60 PA	Freetown	Access Facilities	Reynolds Bors., Inc.	87,168.00
63 PA	Hamilton	Access Facilities	Malcolm E. Boynton	30,568.00
2701	Harwich	Dredging	Hydro-Dredge Corp.	19,200.00
2632	Harwich	Marina Facilities	Kidd Constr. co.	368,749.00
2691	Hull	Timber Pier	Fairhaven Marine	66,000.00
2665	Marblehead	Pier Constr.	No. Shore Dredging & Marine Constr.	26,128.00
2713	Marblehead	Dredging	Hydro-Dredge Corp.	29,510.00
2705	Marion	Shore Protection	Rapoza's Crane Serv.	10,566.00
2711	Marshfield	Sea Wall	Ernest Minelli, Inc.	32,100.00
56 PA	Merrimac	Access Facilities	Salisbury Constr. Co.	33,460.00
48 PA	Monterey	Access Facilities	Arthur H. Hebert & Sons	47,224.00
2672	Nantucket	Dredging	Hydro-Dredge corp.	97,065.00
2712	New bedford	Pier Scales	Mulholland Constr. Co.	28,764.00
2692	Oak Bluffs	Bulkhead	Campanella Corp.	280,673.00
62 PA	Otis	Access Facilities	Western Mass. Constr. Engrs.	32,112.00
2694	Plymouth	Fence Repairs	Auciello Iron Works	3,174.00
59 PA	Richmond	Access Facilities	Haber Sand & Gravel	86,996.00
2706	Sandwich	Shore Protection	Peter P. Cook	28,120.00
2708	Sandwich	Sea Wall	F.V. Lawrence, Inc.	28,772.00



DIVISION OF WATERWAYS

CONSTRUCTION PROJECTS COMPLETED - JULY 1, 1970 TO JUNE 30, 1971 (Cont'd)

<u>CONT. NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>CONTRACTOR</u>	<u>COST</u>
2678	Scituate	Flood Control	Mulcahy Bros.	\$ 16,221.00
106-B	Springfield	Skating Rink	Joseph Orwat & Sons	354,977.00
65 PA	Stow	Access Facilities	McGovern Constr.	28,450.00
57 PA	Sutton	Access Facilities	H.W. Sorenson & Sons	40,560.00
2667	Westfield	Stream Clearance	B & M Constr. Co.	15,038.00
2700	Westport	Harbor Improvements	F.L. Tripp & Sons	17,505.00
2664	Weymouth	Flood Control	G. Bonazzoli & Sons	1,225,000.00
107-B	Worcester	Skating Rink	Granger Bros., Inc.	277,374.00
2615	Worcester	Drainage Control	Corio Bros.	<u>652,046.00</u>
32 Projects Completed TOTAL				\$4,170,000.00



DIVISION OF WATERWAYS

OBJECTS UNDER CONSTRUCTION AS OF JUNE 30, 1971

<u>NT. NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>CONTRACTOR</u>	<u>EST. COST</u>
4-B	Brockton	Skating Rink	Delfour Inc.	294,000.00
3-E	Haverhill	Skating	Rink D. Antonellis	1,043,000.00
32	Harwich	Marina Floats	P.C.A. Constr.	46,000.00
5-B	New Bedford	Skating Rink	D. Antonellis, Inc.	1,088,000.00
93	North Attleboro	Dan & Access Facilities	T & T Constr.	195,000.00
20	Peabody	Flood Control	R.A. Bucella & Sons Inc.	129,000.00
6-B	Peabody	Skating Rink	D. Antonellis	1,059,000.00
02	Plymouth	Sea Wall	Gracia Bros., Inc.	57,000.00
51	Quincy	Shore Protection	Ernest Minelli, Inc.	50,000.00
PA	Sandwich	Access Facilities	Raso Construction	16,000.00
14	Scituate	Sea Wall	G. Bonazzoli & Sons	76,000.00
82	Southbridge	Stream Improvement	Northeastern Constr. Co.	38,000.00
26	Wakefield	Stream Improvement	Wales Corp.	127,000.00
PA	Winthrop	Access Facilities	Vitale & Sons Co., Inc.	<u>159,005.00</u>
14 Projects Total				\$4,377,005.00





DIVISION OF WATERWAYS

PROJECTS UNDER DESIGN OR IN PROCESS AS OF JUNE 30, 1971

<u>CONT. NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>EST. COST</u>	<u>REMARKS</u>
10-B	Attleboro	Swimming Pool	\$ 300,000.	Design 60%
	Barnstable	Dredging	75,000.	Design 25%
	Barnstable	Access Ramp	40,000.	Design 5%
	Boston (Ch's'n)	Access Ramp	150,000.	Design 25%
	Bourne	Dredging	80,000.	Design 30%
	Chatham	Dredging	25,000	Design 80%
20B	Chilcopee	Swimming Pool	350,000.	Design 30%
735	Dedham	Flood Control	77,000.	Design 95%
	Dennis	Shore Protection	16,000.	Design 50%
742	Eastham	Shore Protection	10,000.	Design 90%
8PA	E. Bridgewater	Access Ramp	20,000.	Design 90%
699	Falmouth	Shore Protection	70,000.	Design 70%
21B	Fall River	Swimming Pool	350,000.	Design 30%
652	Ipswich	Flood Control	35,000.	Design 100%
22B	Lawrence	Swimming Pool	350,000.	Design 50%
23B	Leominster	Swimming Pool	300,000.	Design 95%
536	Lexington	Flood Control	60,000.	Design 50%
24B	Lowell	Swimming Pool	350,000.	Design 30%
	Manchester	Dredging	90,000.	Design 20%
730	Manchester	Flood Control	38,000.	Design 100%
14B	Marlboro	Skating Rink	1,050,000.	Design 95%



DIVISION OF WATERWAYS

PROJECTS UNDER DESIGN OR IN PROCESS AS OF JUNE 30, 1971 (Cont'd)

<u>CONT NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>EST. COST</u>	<u>REMARKS</u>
703	Milford	Dam Reconstruction	475,000.	Design 100%
738	Monterey	Dam Reconstruction	275,000.	Design 40%
719	Newton	Flood Control	230,000.	Design 90%
715	Newburyport	Sea Wall	158,000.	Constr. Start Sept.
717	Orleans	Bulkhead	95,000.	Constr. Start Sept.
737	Peabody	Flood Control	118,000.	Open Bids 7/13/71
723	Plymouth	Wharf Repairs	18,000.	Constr. Start Sept.
725	Plymouth	Bulkhead Reconstr.	126,000.	Constr. Start July
729	Quincy	Shore Protection	125,000.	Design 20%
718	Quincy	Shore Protection	71,000.	Design 30%
739	Quincy	Shore Protection	25,000.	Design 90%
680	Salem	Flood Control	700,000.	Design 100%
09-B	Sandwich	Recreational Facilities	900,000.	Design 80%
	Sandwich	Shore Protection	60,000.	Design 5%
7PA	Shrewsbury	Access Facilities	49,000.	Design 100%
25B	Southbridge	Swimming Pool	300,000.	Design 60%
26B	Springfield	Swimming Pool	350,000.	Design 30%
17B	Taunton	Skating Rink	1,050,000.	Design 95%
707	Wareham	Dredging	170,000.	Constr. Start Oct.
	Webster	Access Facilities	50,000.	Design 20%
737	Winthrop	Shore Protection	24,000.	Constr. Start July
731	Winthrop	Flood Control	37,000.	Design 95%
734	Winthrop	Harbor Improvements	40,000.	Design 100%



DIVISION OF WATERWAYS

PROJECTS UNDER DESIGN OR IN PROCESS AS OF JUNE 30, 1971 (Cont'd)

<u>INT. NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>EST. COST</u>	<u>REMARKS</u>
71	Worcester	Flood Control	750,000.	Design 95%
04	Worcester	Dam Reconstruction	250,000.	Design 70%
7B	Worcester	Swimming Pool	<u>350,000.</u>	Design 30%
47 Projects TOTAL\$10,630,000.				

The Division of Waterways during fiscal 1971 held numerous public hearings for petitions for structures in, over or under tidewater, great ponds and certain streams and for excavation or dredging in the same. As a result of these public hearings 138 licenses and 19 permits were granted.

Approximately \$110,000.00 was received for fees for rights and privileges granted under licenses in the Commonwealth tidelands.

The Division made over 500 field inspections to see that work done complied with the license or permit.

The Division under the provisions of Chapter 130, Section 27A and of Chapter 131, Section 40 of the General Laws (the so-called Jones and Hatch Acts) receives notices from persons planning to fill or dredge on costal or inland waters. The Division's function is to determine what jurisdiction, if any, comes under the provisions of Chapter 91 of the General Laws. Approximately 400 to 500 such notices are received annually.

The Division, since October 27, 1970 when Chapter 595 of the Acts of 1970 became effective, has made over 30 field inspections of dams and has reviewed approximately 100 field inspections made by District highway personnel.



DIVISION OF WATERWAYS

The Division during fiscal 1971 supervised the transportation of solid waste across Massachusetts Bay and the offshore burning of approximately a quarter of a million tons of combustible building demolition material.





**F**



## BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

The Bureau of Transportation Planning and Development, Massachusetts Department of Public Works, was established in accordance with legislation adopted by the Acts of 1964, Chapter 563. The executive and administrative head of the Bureau is the Director of Transportation Planning and Development.

This Bureau serves as the principal source of transportation planning in the Commonwealth and conducts research, surveys, demonstration projects, and studies in cooperation with the Federal government, other governmental agencies, and appropriate private organizations and is responsible for the continual preparation of comprehensive and coordinated transportation plans and programs. In addition, it maintains a data bank of all available transportation information statistics for reference use by all public agencies in the Commonwealth.

### ROAD INVENTORY

#### RURAL AND URBAN INVENTORY PROGRAM

The Rural and Urban Inventory Program has progressed during Fiscal Year 1971, and is now into the third year of the previously announced five-year update schedule.

To date, field work has been completed in Berkshire, Franklin, Hampshire, Hampden, Suffolk, and Essex counties, and field work in Middlesex County has been started.

Office work, which includes coding, keypunching, and editing has been completed in the above-mentioned counties.



## BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

### RURAL AND URBAN INVENTORY PROGRAM (Cont'd)

Work also was initiated on updating the inventory file based on information received from local officials.

In addition to the aforementioned, a Railroad Highway Grade Crossing Inventory was undertaken and completed. This inventory included information on every railroad-highway grade crossing in the Commonwealth.

### INTERSTATE TRAVELED-WAY STUDY

The data for the 1970 Traveled-Way Traffic Map was compiled and transmitted to the Federal Highway Administration for inclusion in their National Map System of Interstate and Defense Highways. Comparison of 1960 and 1970 traveled-way data was completed and submitted to the FHWA.

### BRIDGE RECORD - NATIONAL DEFENSE HIGHWAY SYSTEM

The Annual "Bridge Record" Report was prepared and printed. It was prepared at the request of the Federal Highway Administration for use by the U. S. Department of Defense in their activities. The report shows the load carrying capabilities, horizontal and vertical clearances of all highway structures which may be used for large movements of military personnel, equipment and supplies or for civil defense purposes in or through the Commonwealth.

### MAPPING - RURAL AND GENERAL

A new copy of the Federal-Aid System was made on County Series Mylar reproducibles using smaller symbols than those used last year on the acetate. The smaller symbol as well as the water outline



## BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

### MAPPING - RURAL AND GENERAL (Cont'd)

make the new maps easier to read. The mylars are easier to handle and hopefully less perishable than the acetate. Copies of these plans are in high demand from all units concerned with various types of Federal-Aid highway programs. The shading representing urban areas has been temporarily omitted from these plans pending the updating to be based on the 1970 Federal Census. All of the Mylars have been signed by the Chief Engineer and the Federal Highway Administration Division Engineer.

A draft copy of a Federal-Aid Route Log of both primary and secondary route systems has been prepared but it is not ready for distribution since much additional work is needed before general distribution can be made.

Another tabulation of Federal-Aid primary and secondary routes is being prepared on Federal-Aid form PR 455. These forms, giving brief route descriptions, are required with each route change, thus this tabulation will automatically be updated as changes in the Federal-Aid System are made. These PR 455 route descriptions have been requested by the FHWA.

### URBAN AREA CHANGES

The Pittsfield urban area, as well as the Barnstable urban area has been extended.

### FEDERAL-AID SYSTEMS REVISION

Several submissions have been made to the FHWA - Department of Transportation, requesting minor changes in the Federal-Aid primary





## BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

### FEDERAL-AID SYSTEMS REVISION (Cont'd)

and secondary route systems, eight (8) of which were a part of our plan of cooperation with the State of Rhode Island for coordination of Federal-Aid routes at state lines.

### FEDERAL-AID PRIMARY TYPE II SYSTEM

No Type II maps were produced by this section; however, this section has reviewed all changes required by the FHWA regarding Federal-Aid routes on these maps.

### MISCELLANEOUS PROJECTS

Work has been done on a statewide traffic flow map. Work also has been done on a statewide map showing State Highways as well as the Federal-Aid route system.

The County Series maps sheets have been distributed, via the Library, to interested parties within and outside the Department.

Many requests concerning available maps and aerial photos are answered weekly by this section.

### TRAFFIC VOLUME COUNTING PROGRAM

The "1969 Traffic Volumes" publication, containing ADT volumes for both calendar years 1968 and 1969 at approximately 2000 locations, was completed and distributed. Approximately 200 copies have been sold to interest individuals and firms.

Approximately 3200 volume counts were taken during Fiscal Year 1971 from continuous, control, and coverage counting stations. In addition, approximately 1400 special counts were taken, of which over 400 counts were for the National Highway Functional Classification and Needs Study.



## BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

### TRAFFIC VOLUME COUNTING PROGRAM(Cont'd)

Turning movement studies and vehicle classification studies, required for project design, were conducted at various locations statewide.

Permanent and control station data were reviewed and edited.

The program for the installation of magnetic loop detectors was continued for construction, reconstruction, and maintenance projects.

Field data for an Origin and Destination Study in the Williamstown - North Adams area was obtained. This data has been compiled and tabulated for further analysis by others.

### VEHICLE WEIGHT AND CHARACTERISTICS STUDY

The purpose of this annual study is to establish truck characteristics relative to magnitude, composition, axle weights, gross weights, and commodities carried.

The field data was obtained at fourteen locations throughout the State during July and August of 1970. The data was processed and transmitted to the Federal Highway Administration for inclusion in the Highway Statistics Report.

### TRAFFIC ANALYSIS AND FORECASTING

During Fiscal 1971, the Systems Planning and Traffic Estimating Unit received 50 requests for traffic analysis and forecasts. Also, 52 projects were completed in the following categories:

#### ROUTE ANALYSIS

Route C1 - East Boston Feasibility Study

Relocation Route 44 - Carver-Kingston-Plymouth



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

ROUTE ANALYSIS (Cont'd)

Relocation Route 110 - Salisbury (Northern Alignment)

I-86 - Sturbridge

Route 8 - Sandisfield

Route 2A - Shirley-Ayer

Route 1 and 109 - Dedham-Boston

Route 20 - West Springfield

Salem-Beverly Connector

Route 2 - Wendell-Phillipston

Route 129 and I-93 Intersection - Wilmington

Route I-391 - Chicopee

Route 146 - Millbury-Sutton

Relocation Route 57 - Agawam-Southwick

Relocation Route 123 - Attleboro-Brockton

Route 129 and 38 Intersection - Wilmington

Relocation Route 140 - West Boylston-Gardner

Route 6 - Dartmouth

Route 146 - Uxbridge-Sutton

Route 128 and Endicott St. Intersection - Danvers

Route 125 and 133 Intersection - North Andover

Relocation Route 2 - Fitchburg-Leominster

Salisbury Beach Connector - Southern Alignment

Route 126 - Bellingham

Relocation Route 125 - Haverhill

Route 25 and Bay St. Intersection - Taunton



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

TOPICS PROJECTS

Boston	Fall River
Charlestown	Brookline
Danvers	Watertown
Milton	Pittsfield

SAFETY PROJECTS

Chelmsford - Lowell - Lowell Connector

AREA PROJECTS

Westwood - East Street  
Burlington - Woburn - Lexington - Bedford  
Waltham - Winter Street

HIGHWAY STATISTICS

RURAL AND URBAN HIGHWAY MILEAGE ANALYSIS

The Annual Mileage Reports for the year ending December 31, 1970 are being completed and will be forwarded to the FHWA.

Highway mileages, both local and State, are reported on a series of forms which are interrelated as to total mileage analysis. Each report, however, reflects a separate and individual mileage analysis.

Collectively, they represent mileages by rural, urban, and municipal classifications on Federal Aid Systems, and also mileages by surface types, widths, number of lanes, average daily traffic and access control.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

RURAL AND URBAN HIGHWAY MILEAGE ANALYSIS (Cont'd)

Publications to be printed for distribution:

Local Road Mileage - December 31, 1970

Highway Mileage Statistics - 1970

Travel and Accident Report TA-1 portion required by Planning was completed and forwarded to the Traffic Section to be completed and forwarded to the FHWA.

HIGHWAY VEHICLES USING FUEL OTHER THAN GASOLINE

Annual Report on vehicles using diesel oil for fuel was completed and forwarded to the FHWA. Both the number of owners and the number of each type of vehicle were indicated on this report.

LOCAL HIGHWAY FINANCE ANALYSIS

Work in 1971 included collecting and analyzing the receipts and disbursements for all highway purposes by the local government units in Massachusetts. The statistical report was prepared from data usually contained in Schedule A of the annual city and town financial reports as submitted to the Bureau of Accounts, Department of Corporation and Taxation.

The collection of the data represents a tremendous amount of effort in verifying and analyzing the accounts to fulfill the detailed categories of expenditures and receipts required by the Federal Highway Administration's "535" Report. In addition, data from each of the 351 cities and towns was assembled by groups according to population for Standard Metropolitan Statistical



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

LOCAL HIGHWAY FINANCE ANALYSIS (Cont'd)

Areas and for counties.

This report also covers information relating to the Maurice J. Tobin (Toll) Bridge of the Massachusetts Port Authority, the Callahan and Sumner Tunnels as well as the turnpike of the Massachusetts Turnpike Authority, and the public parking facilities of the Massachusetts Parking Authority.

ECONOMIC STUDIES

HIGHWAY SOCIO-ECONOMIC IMPACT STUDIES

Negotiations have been carried out with a university as a consultant for a study of the community impact of interstate highways I-91 and I-291 in the Springfield, Massachusetts area.

The study contemplates an integrated approach involving social effects, environmental effects, physical effects, and economic effects. Emphasis will be on the social and environmental effects. Physical and economic effects will be considered only as they relate to the social and/or environmental impact. The study objective is community impact. Thus, the study area is expanded far beyond the confines of the corridor itself. More important, with respect to the problem needs, is the concentration of the proposed study on "non-use" effects as contrasted to most other studies which concentrate on the facility itself and its use benefit to the community.

Representatives of the Federal Highway Administration have reviewed the preliminary proposal and made suggestions for the



## BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

### HIGHWAY SOCIO-ECONOMIC IMPACT STUDIES (Cont'd)

proposed contract. It is anticipated that a contract will be executed so that the study will start in the Autumn of 1971.

### STATEWIDE HIGHWAY TRANSPORTATION STUDY

#### FUNCTIONAL CLASSIFICATION AND SYSTEMS DEVELOPMENT

The classification Phase is a continuing effort and includes the following:

The initial development of the Federal-Aid Primary Type II networks in urban areas in conjunction with the TOPICS program. To date, Type II systems have been developed for 100 communities in the Commonwealth.

Furnishing classification data to various consultant firms in connection with their work on Master Plans (701 Studies) for local communities.

#### HIGHWAY NEEDS APPRAISAL

The Needs Phase is a continuing effort and includes the following:

Furnishing needs data to various consultant firms in connection with their work on Master Plans (701 Studies) for local communities.

Developing needs information, capacities, conditions and type of work on city and town maps for use in connection with the TOPICS program.

#### FISCAL STUDY

Maintenance of current status for the continuing Finance Study involved attention to the original 500 tables and reports. Such material was augmented and new material developed from the reports



## BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

### FISCAL STUDY (Cont'd)

of Federal, State, County, and local governmental agencies as well as from transportation authorities, private organizations and other sources. There was an increase in the number of requests for information not contained in regular reports.

Maintenance and refinement of finance information and production of regular supplementary and special reports involved compilations for use in future up-dates of earnings - credit, incremental, vehicle classification and other analyses.

### URBAN TRANSPORTATION PLANNING

#### EASTERN MASSACHUSETTS AREA

The first step of this study indicated in the Work Program was the validity of the forecasting procedure. This task was related to and integrated with the program for the Boston Transportation Planning Review. Negotiations for a contract for the task was begun early in the fiscal year. Due to delays necessitated by the integration with the Planning Review the contract was not executed until May 7, 1971. Peat, Marwick, Mitchell & Co., the consultant on this contract, has commenced work on this contract.

The work commenced on May 13, 1971. The contract specifies a completion scheduled in 12 months. However, to meet the needs of the Boston Transportation Planning Review, a schedule was established for completing the work in 7 months.

Two additional contracts were let to meet requirements related to the work program. One was to Computer Usage Development Corp.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

EASTERN MASSACHUSETTS AREA (Cont'd)

to modify the existing capacity restraint assignment to enable variations in the volume/capacity relationship for different type facilities and to allow assignments in increments. The other contract was with Systematic Data Processing Services for computer services required to carry out the work program in the Peat, Marwick, Mitchell & Co. Contract.

BOSTON METROPOLITAN AREA

The Technical Advisory Committee of the Boston Metropolitan Area Transportation Study held regular monthly meetings relative to the continuing planning process. The TAC acting as the Policy Committee has endorsed 17 proposed areawide TOPICS plans and recommended Type II networks. The TAC has also advised the Department on many transportation planning matters.

As a result of the recommendations of the Governor's Task Force on Transportation, the Governor imposed a moratorium on all expressway construction inside Route 128 with the exception of the last section of I-93 between Medford and Boston. The Governor also requested that a study be made of all transportation alternatives called "The Boston Transportation Planning Review" under the direction of Professor Alan A. Altshuler. The consultant firm of System Design Concepts was hired to prepare a Study Design which was completed in November. The Study Design was approved for Federal funding and final contract negotiations are being completed with the consultant firm of Alan M. Voorhees and



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

BOSTON METROPOLITAN AREA (Cont'd)

Associates, Inc. The contract is expected to be signed early in Fiscal 1972. The Study itself is expected to extend over an 18-month period with sufficient intermediate information being available to make some critical transportation decisions as the Study progresses.

All data collection for the first Annual Review Report was completed and analyzed, and the Report was published and distributed. The Report compares and evaluates available items of socio-economic data and transportation system characteristics as related to the forecasts made in the Eastern Massachusetts Regional Planning Project's "Recommended Highway and Transit Plan".

A considerable amount of staff time and some computer time was spent in providing informational requests to public, State, regional, national, and international agencies and to a lesser extent to private companies and groups.

CENTRAL MERRIMAC VALLEY AREA

This area is one of four segments comprising the former Eastern Massachusetts Regional Planning Project Area; however, it is still tied to the total area for traffic assignment procedures. It was planned to separate this area from the EMRPP assignment procedure, but it was not possible due to the lack of sufficient funds and available personnel to accomplish the task of recoding the data.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

CENTRAL MERRIMAC VALLEY AREA (Cont'd)

Department personnel have attended the Central Merrimack Valley Regional Planning Commission monthly meetings regularly, thereby establishing liaison with the participating communities.

Various highway presentations such as the TOPICS program, the tentative Urban System, etc. have been made in the area by the Department to keep the citizens informed as part of the continuing, comprehensive, cooperative, transportation planning process.

Preliminary negotiations were started with the Regional Planning Commission to supply socio-economic data for use in the Annual Review Report.

LOWELL STUDY AREA

This area is also one of four segments that one comprised the former Eastern Massachusetts Regional Planning Project, however, it is still tied to the total area for traffic assignment procedures. Like the other four areas, it was hoped that the past year might have seen the removal of this area from the EMRPP assignment procedure, but it was not possible due to the lack of sufficient funds and available personnel to accomplish the task.

An effort was made during the year to reorganize the Transportation Coordinating Committee with a new approach they recommended involving the establishment of the TCC as a committee of the Northern Middlesex Area Commission. This arrangement has been consummated by a Memorandum of Agreement.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

LOWELL STUDY AREA (Cont'd)

Department personnel have attended the Area Commission's monthly meetings regularly, thereby establishing good liaison with its members.

A presentation of the Urban System was made to the Lowell community officials.

Preliminary negotiations were started with the Regional Planning Commission to supply socio-economic data for use in the Annual Review Report.

During the year good communications and working relationships have been developed with the Northern Middlesex Area Planning Commission.

OLD COLONY (BROCKTON) AREA STUDY

This area is another segment of the former Eastern Massachusetts Regional Planning Project Study Area, however, it is still tied to the total area for traffic assignment procedures. Like the Central Merrimac Valley and Lowell Study areas it was not possible to remove this area this year from the EMRPP assignment procedure due to the higher priority demands on our resources.

An effort was made during the year to reorganize the Transportation Coordinating Committee and met with success when a Memorandum of Agreement was signed establishing the T.C.C. as a committee at the Old Colony Planning Council.

Department personnel have attended the Area Planning Commission monthly meetings quite regularly, thereby, establishing good liaison with the regional agency.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

OLD COLONY (BROCKTON) AREA STUDY (Cont'd)

Various transportation presentations such as planning seminars, and tentative urban systems have been made in the area by the Department to fulfill the continuing, comprehensive, cooperative, transportation planning process.

Preliminary negotiations were started with the Regional Planning Commission to supply socio-economic data for use in the Annual Review Report.

Improved communications and working relationships were achieved this year with the Old Colony Planning Council.

SOUTHEASTERN MASSACHUSETTS AREA TRANSPORTATION STUDY

This study area consists of 30 communities, and is one of the largest study areas in the State.

The Transportation Coordinating Committee in this area is relatively active, having at least quarterly meetings during the year. A new sub-committee of the T.C.C. was formed this year to act on the TOPICS matters.

A fine cooperative working relationship has been developed with the Regional Planning Commission and also with the U. S. Department of Agriculture by the Bureau of Transportation Planning and Development's participation in land use updating and by participating as a member of the Transit Steering Committee for the S.E. Massachusetts area.

Another aspect of the continuing planning phase was the collection of available socio-economic data and preparation of an Annual Report on the growth of the study area as it concerns the



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

SOUTHEASTERN MASSACHUSETTS AREA TRANSPORTATION STUDY (Cont'd)

consistency with the original forecast. This Report has been sent to the Regional Planning Commission for their review and comment.

The Southeastern Massachusetts Study Area has been the scene of many transportation presentations such as the TOPICS program, the tentative urban system etc. as part of the 3C process.

SPRINGFIELD AREA TRANSPORTATION STUDY

This study is comprised of the Cities of Chicopee, Holyoke, Northampton, Springfield, Westfield and twenty-five (25) surrounding towns.

Preliminary steps have been taken to transfer the Transportation Coordinating Committee function to a committee within the Lower Pioneer Valley Regional Planning Commission.

Department personnel have attended the Lower Pioneer Valley Regional Planning Commission meetings regularly, thereby establishing good liaison with the members representing the Communities.

A presentation of the Urban System was made to the Regional Planning Commission and the governing officials of the area. The Department also participated in a Planning Seminar as part of the continuing, comprehensive, cooperative planning process.

Further implementation of the three C process is being negotiated with the Regional Planning Agency for assistance in preparing the Annual Review Report on the socio-economic growth of the area.



## BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

### WORCESTER AREA TRANSPORTATION STUDY

This study comprises the City of Worcester and eleven (11) surrounding towns.

The Transportation Coordinating Committee function has been transferred to a committee of the Central Massachusetts Regional Planning Commission with a memorandum of understanding yet to be finalized.

Bureau of Transportation Planning and Development representatives have met with the Central Massachusetts Regional Planning Commission staff and community officials numerous times during the year, covering such subjects as the tentative urban system, collection of data for an Annual Review Report and analysis of area transportation problems and goals.

An Annual Review Report of the study area was completed in early 1971.

The Bureau cooperated with the City of Worcester in supplying pertinent travel data collected in the original transportation study to be used for a study of transportation between poverty pockets and employment centers.

Preliminary negotiations have taken place with the Regional Planning Commission to supply socio-economic data to be used in the next Annual Review Report.

### FITCHBURG-LEOMINSTER AREA TRANSPORTATION STUDY

The Study area encompasses two (2) cities and two (2) towns for a total of four (4) communities.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

FITCHBURG-LEOMINSTER AREA TRANSPORTATION STUDY (Cont'd)

The Transportation Coordinating Committee has been fairly active in pursuing regional transportation goals by meeting with Department of Public Works officials. Bureau of Transportation Planning and Development representatives have met with the Transportation Coordinating Committee, local governing officials, and the Montachusett Regional Planning Commission during the year on transportation matters, such as the tentative urban system and collection of data for an Annual Review Report.

Negotiations with a consultant for an update of the Fitchburg-Leominster Study Area data is nearing completion.

PITTSFIELD AREA TRANSPORTATION STUDY

The study area consists of the City of Pittsfield and the Towns of Dalton, Lanesborough and Lenox.

A presentation of the tentative Urban System was made at a meeting attended by interested citizens and public officials.

A representative from the Department attended the Berkshire County Regional Planning Commission meetings regularly, thereby establishing good liaison with its community membership.

The Transportation Coordinating Committee in this area continued to be one of the most active. It assisted the Department in the TOPICS program, urban system and in the continuing, comprehensive, cooperative planning process.

Preliminary negotiations have taken place with the Regional Planning Commission to have them supply socio-economic data to be used in the next Annual Review Report.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

COMPREHENSIVE TRANSPORTATION PLANNING FOR SMALLER URBAN AREAS

A work program was being developed and negotiations were being conducted with a consulting firm, for comprehensive state-wide transportation planning for small urban areas, when the F.H.W.A. in keeping with the Federal Highway Act of 1970, changed their requirements for the need for such studies, which in turn terminated our negotiations with the consultant.

A detail work program and procedures were prepared for an Origin and Destination study in the Williamstown-North Adams area and were carried out jointly with the staff of District #1 in July and August of 1970.

This Origin and Destination survey is to update travel data last taken in 1962, supply need data for TOPICS and for the small urban area transportation study.

The field work to the O & D has been completed along with classification of routing in the office also has been completed. Further analysis is still being done on the data in the office.

UNITED STATES CENSUS 1970 DATA

Request has been made to the U. S. Census Bureau for the special tabulation of Census data by traffic zones for each of the urban transportation study areas. The table of equivalences between traffic zones and census unit areas has been prepared. We are presently waiting for the forms and maps from the Census Bureau on which the information has to be transferred to meet their requirements.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

UNITED STATES CENSUS 1970 DATA (Cont'd)

The data will be made available to other organizations having need for them. The Federal Highway Administration has made a request that the Department coordinate all applications for the tabulations of the data by traffic zones.

The first count summary tapes are now available. Due to delays in delivery, the scheduled availability of the summary tapes has been considerably off schedule. No tabulation has been made from the available first count tape as yet. Some tabulations for statewide distribution have been made by the Office of Planning and Programming Coordination. Facilities for tabulation of the census data has been established through the Department of Community Affairs at the Worcester Polytechnic.

The fourth count tapes should be available in roughly six months according to the present schedule. The fourth count tapes are the first data tapes covering the sampled data, including the journey to work information.

SPECIAL STUDIES

REVISED INTERSTATE COST ESTIMATES

Traffic forecasts were prepared for 1970, 1975, 1990, 2000 and design year for all segments of the contemplated interstate system.

Segment traffic forecasts, including all necessary design criteria, for Table TF-2 were developed and coded, key punched, verified, and submitted to Washington as per directive.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

REVISED INTERSTATE COST ESTIMATES (Cont'd)

Table TF-3 was worked on to develop statewide and urban data for the years 1970, 1975, 1990 and 2000.

State line traffic forecasts, including design criteria for the years 1970, 1975, 1990, 2000 and design year were coordinated with the states of Connecticut, Rhode Island, Vermont, New Hampshire and New York.

GOODS MOVEMENT STUDY

This study was the start of a goods movement all modes investigation. The report concerns itself with the for-hire trucking industry including general freight, sand and gravel, petroleum distribution and Port of Boston truck use.

The basic data was developed by a 100% census of for-hire truck operators and a questionnaire sampling in the Highway Districts.

This phase is complete with a draft report having been forwarded to the FHWA Division Office on May 15, 1971.

The following highlights are significant facts and deficiencies developed:

1. Annual mileage of for-hire trucks is 25,400 miles per vehicle.
2. Average loads were 13 tons in long-range operations and 9 tons on short-haul operations.
3. Ton miles per truck average 328,000.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

GOODS MOVEMENT STUDY (Cont'd)

4. Over 50% of the cargoes were classified as general freight by the operators with no other classification exceeding 20%.
5. Less than 10% of Port of Boston tonnage is classified as general cargo, the balance is bulk cargo, mainly petroleum. 75% of general cargo arrives or leaves the docks by truck, the balance arrives or leaves in rail freight cars.
6. It is estimated that 190,000 trucks move approximately 900,000 tons of general cargo and 7,800 rail cars move 300,000 tons.
7. Sand, gravel, and reddi-mix operators average approximately 18 tons per load and generate approximately 19,000 annual miles per truck and 204,000 ton miles per truck.
8. Petroleum (gasoline and fuel oil) distribution in Massachusetts generates approximately 50,000 trips per day originating at 192 distribution points and ending at over 1,000,000 consumption points.

NATIONAL CLASSIFICATION AND NEEDS STUDY

During Fiscal Year 1971, the work program as specified in Manual "B" of the National Transportation Planning Study was completed by the Department. This Study is being conducted by the fifty states in cooperation with the U. S. Department of Transportation, Federal Highway Administration, Bureau of Public Roads.





## BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

### NATIONAL CLASSIFICATION AND NEEDS STUDY (Cont'd)

Manual "B" is the highway portion of a comprehensive set of transportation manuals which the U. S. Department of Transportation has prepared to assess the current conditions and future needs of all domestic modes of travel.

The Classification Phase of the Study encompassed all existing mileage plus that needed to satisfy 1990 demands. Highway needs were evaluated on a sample of the functionally classified systems and expanded on a statewide basis.

Traffic forecasts, including design criteria, were developed for the stratified samples within the various counties. Samples were developed by the Highway Needs Unit. Work was done in all counties of the Commonwealth except Berkshire and Hampden counties which were done in 1970. The forecasts were developed for 1418 individual segments of the various highway and street systems.

### EFFECT OF MBTA SOUTH SHORE EXTENSION ON S. E. CORRIDOR TRAVEL PATTERNS

During the past year (November 1970) vehicle counts at 100 directional locations were completed in this corridor. Occupancy counts for person trips were processed at 15 locations. These data taken combined with transit person trips to be supplied by others will constitute a before picture in the corridor as it traverses Quincy.

During the current year (in the same season) these counts will be repeated in an attempt to establish the dimension of modal trends.



## BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

### DEVELOPMENT OF THE FEDERAL-AID URBAN SYSTEMS

As a result of the 1970 Highway Act this Department undertook a program to cooperatively select with the communities of the urbanized areas a new network of roadways entitled "The Urban System".

A tentative selection of the Urban System was made in accordance with the guidelines established by the Federal Highway Administration. Once the tentative system was placed on plans and written descriptions composed, a series of presentations were made throughout the State to the Communities affected by the new system.

These presentations have brought together the governing officials of the communities along with regional planning commission representatives and transportation coordinating committees in order to participate in the continuing, comprehensive, cooperative planning process.

### STATEWIDE AIRPORT SYSTEM STUDY

By Interagency Agreement, the Massachusetts Aeronautics Commission and the Massachusetts Department of Public Works have jointly embarked on a two-year Statewide Airport System Study with the cooperation of the Federal Aviation Administration. The Massachusetts Aeronautics Commission is the sponsor of the project for a Federal planning grant and the Director of the Bureau of Transportation Planning and Development is the Project Manager.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

STATEWIDE AIRPORT SYSTEM STUDY (Cont'd)

All of the publicly used airports in the State as well as military installations at Oits, South Weymouth, Westover, and Ayer will be evaluated in accordance with the goals of the Study of the year 1990.

The goals are to provide for the orderly and timely development of a system of airports adequate to meet the aeronautical and air transportation needs of the State, its metropolitan areas, and the nation in response to development and growth goals and patterns coordinated with other modes of transportation; to ensure compatibility of airport plans with the planning and goals of State, metropolitan, and urban agencies in the areas of transportation, land use, economic development, the environment and resource utilization, and to provide a basis for coordination with all planning including airports in adjoining states.

LOGAN AIRPORT TRAVEL STUDY

The purpose of this study is to obtain and analyze ground access data by persons and vehicles to explore the feasibility of providing new transit service to the air terminal. In addition, a profile of air travelers, employees, visitors, and air cargo trip making will be developed. The characteristics of person travel will be analyzed by urban zones in the transit district and by city and town statewide. Other parameters are income, distance of ground trip, trip purposes, luggage, mode of access, air trip distance, size of travel party, and sex.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

LOGAN AIRPORT TRAVEL STUDY (Cont'd)

The data was collected by means of an on-site interview of the various classes of airport users and a cordon counting control operation.

The study was scheduled for completion in June 1971, but processing delays have advanced the date for a draft report to September 1971. The current status is approximately 80% complete.

The following general data intelligence has emerged at this time:

1. Average daily weekday person trips in and out of Logan Airport are on the order of 107,600 person trips.
2. Average weekday vehicle trips on the Route C-1 entrance and exit are approximately 50,000 with 6,000 on Frankfort Street, 5,500 on Porter Street and less than 500 on Maverick Street.
3. Peak hours on the C-1 ramps average approximately 8% inbound or outbound - in the range of 1800 vehicles per hour. The peak in the immediate terminal area is slightly higher because inbound and outbound traffic are combined. However, at this point the roadway peels off at different levels.
4. 9.9 million trips annually are made: 49% by private car, 16% by taxi, 7% by rental car, 6% by transit, 3% by limousine, 14% are connecting plane flights, and 3% unreported. These are ground trips by air passengers.





## BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

### LOGAN AIRPORT TRAVEL STUDY (Cont'd)

5. The major purposes are: 40% business, 40% pleasure, 9% personal and family reasons, 5% military.
6. Approximately 10% of air travel origins or destinations are international trips.
7. 40% of Logan Vehicle trips use the Sumner-Callahan Tunnels. This is true at peak and off peak periods.

### NATIONAL BRIDGE INSPECTION PROGRAM INVENTORY

The bridge inventory data section of the National Bridge Inspection Program was assigned for completion to the Statewide Transportation Section. The data is in the process of being extracted by electronic computer from the rural and urban road inventory data bank.

### MASSACHUSETTS RAILROAD INVENTORY

Investigation of the feasibility and advisability of creating a transportation land bank was commenced with an inventory of all existing and proposed surplus railroad rights-of-way.

Also, data is being collected for the railroad and marine terminal aspects of the National Transportation Needs Study.

### INTERSTATE TRANSPORTATION COORDINATING COMMITTEES

The two Tri-State Transportation Committees formally established by Memorandums of Understanding with adjacent state highway departments in 1965 met this year for their sixth annual meeting to discuss mutual problems, exchange of planning data and to coordinate planning of transportation facilities crossing state



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

INTERSTATE TRANSPORTATION COORDINATING COMMITTEES (Cont'd)

boundaries or having interstate implications.

Massachusetts was the host for the meeting of the Committee comprising Rhode Island, Connecticut, and Massachusetts which was held in Boston.

The other meeting was held at Northfield, Massachusetts for the Committee comprising the states of New Hampshire, Vermont, and Massachusetts with Massachusetts as the host.



**G**



BUREAU OF SOLID WASTE DISPOSAL

The Bureau of Solid Waste Disposal within the Department was created by Chapter 834, Acts of 1969. The law became effective on November 26, 1969 and the Commissioner was directed to establish the Bureau to carry out its provisions.

Unfortunately, the only provisions for funding the Bureau were to have funds authorized through Solid Waste Disposal Bonds, Acts of 1969. As these bonds were designated to meet only the capital outlay expenditures of the Bureau, no funds were available for staffing.

A budget request was submitted by the Commissioner to correct the funding omission. The budget requested authorization for (26) twenty-six personnel, administrative, office and operating expenses and consulting engineering expenses which totaled \$1,851,232.00. After meetings with the Executive Office of Administration and Finance, the personnel request was reduced to thirteen (13) and a deficiency budget was submitted to cover the period from February to June 30, 1970, which totaled \$189,000.00. The deficiency budget was approved on April 9, 1970, in the amount of \$89,000.00 which finally permitted the staffing of the Bureau. A Director, Assistant Director and Executive Assistant were appointed to organize the Bureau and implement a program for solid waste disposal. Subsequently a Supervising Civil Engineer, Legal Counsel, two Site Coordinators and a clerk were added.

Chapter 834 directed that the Bureau "shall investigate and study the solid waste disposal needs of the Commonwealth and after public hearing, shall develop and submit to the appropriate regional planning agencies for their review and comment; proposed programs for solid waste disposal including plans for their implementation."





BUREAU OF SOLID WASTE DISPOSAL

Therefore, a state-wide study was urgently needed. Not having funds for consulting engineering services, the Bureau initiated a basic survey of the Commonwealth in 1970 and mailed questionnaires to each of the 351 cities and towns. Results of that survey were tabulated and indicated that each person generated nearly one ton of solid waste per year. This waste was disposed of in 220 open dumps, 86 dump and cover operations, 24 sanitary landfills and 20 incinerators.

With the enactment of air pollution standards, many dump and incinerator operations were violating the law and with the introduction of a new sanitary landfill code nearly all disposal operations were illegal. A real serious problem now had been compounded.

Chapter 834 states that certain actions proposed by the Bureau must be concurred in by the Departments of Public Health and Natural Resources, A memo of understanding was prepared and signed by the three agencies in November 1970, which delineated their respective responsibilities. Public Works was named the operating agency which would plan, design, construct and operate solid waste disposal facilities. Public Health was named a regulatory agency which would approve assignment of sites and all design and operating procedures; and Natural Resources was named a regulatory agency which would also approve the assignment of sites.

After the agreement was signed, the Governor designated Public Works as the sole State agency to receive and disburse funds for solid waste activities and to coordinate state-wide activities for solid waste management. This action was approved by the Federal Government in December 1970.



BUREAU OF SOLID WASTE DISPOSAL

Application was made to the Federal Health, Education and Welfare Department for their participation in a state-wide study program. Approval was received and \$134,000.00 was made available as matching funds to complete the survey. The new Federal Environmental Protection Agency is presently administering this activity and it is proposed to request further federal funding for eligible projects.

To comply with the law, a state-wide study was initiated which will inventory all sources of waste, its collection, transfer and disposal; through systems analysis develop a needs study; and finally develop a state-wide plan based on regional disposal facilities. This joint Federal-State study was started in February 1971 and will have a plan submitted by March 1972.

Knowing that action was needed now and could not wait for the state-wide program plan, the Bureau proposed to obtain the services of consultant engineering firms to plan and design facilities for short term solutions for solid waste disposal in critical areas of the State which had shown an interest in regional facilities. Approval was granted to hire consultant firms for the greater Springfield and Worcester areas in May 1971. Contracts are now being prepared to initiate work on the above and hopefully will result in regional solid waste disposal facilities being available by mid 1972.

The most pressing problem in regional solid waste disposal is site location and acceptability by the populace. The Bureau has found that the average person is very interested in the proper disposal of solid waste as long as the site is not in his municipality. The Bureau staff has been investigating sites for sanitary landfill operations throughout the State.



BUREAU OF SOLID WASTE DISPOSAL

One site, in particular, is the Plains Area in Montague. This site has been proposed in the past by private interests and was soundly defeated by area residents. The State proposed the area as a regional sanitary landfill and as a temporary site for metropolitan solid waste as a stop-gap measure while other solutions were being studied. Contracts with local officials again demonstrated highly indignant resentment to the proposal, especially as to its effect on water supplies. To dispel this fear, a feasibility report was prepared by the Bureau but no conclusion could be made on pollution of water supplies by leachate from the proposed sanitary landfill.

The firm of Whitman & Howard was retained to make a hydrogeological survey of the area and report potential pollution effects if any on surface and ground water as the result of a sanitary landfill operation. This report has been completed and if concurred in by the Departments of Public Health and Natural Resources, a public hearing will be held to establish a regional solid waste facility.

During the past year, the Bureau has sponsored seminars on solid waste management, conducted regional informational meetings, prepared articles and speeches on solid waste and cooperated with all other agencies and local officials in day to day matters relative to solid waste disposal problems.

Full support was given to the Federal "Mission 5000" program which is a public education endeavor to eliminate 5000 dumps across the country. Over 300 public officials and interested private citizens attended seminars in Framingham and Northampton.



BUREAU OF SOLID WASTE DISPOSAL

Experiences of the Bureau have shown that its future operations and its ability and endeavors to solve solid waste disposal problems are dependent upon amendments to Chapter 834 of the General Court at the present time. If the law is amended to provide money for administration and consultant services from the solid waste disposal fund; to give the Bureau the right to assign localities to regional disposal districts; to provide grants for research and demonstration projects, including resource recovery, reclamation and recycling, it is expected that the future progress of the Bureau will be more constructive and productive.

The Bureau is charged with a most difficult mission. It needs manpower, money and cooperation of all agencies concerned with the environment, It needs, also, the understanding and support of the people which can be obtained only through continuous and determined public education.





H



## LEGISLATION

### 1972 - RECOMMENDATIONS

1. AN ACT PROVIDING FOR DRIVING A VEHICLE DURING INCLEMENT WEATHER CONDITIONS.

At the present time, Massachusetts Laws do not contain sufficient requirements governing the operation of vehicles on our arterial highway system during inclement weather conditions. This bill would provide for the official declaration of a weather emergency period after local request and would require special traction precautions during such period.

2. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ESTABLISH SPEED ZONING ON ALL NUMBERED ROUTES.

Since 1948 the department and municipalities have been authorized to establish speed zones on ways under their respective controls. For some time now, breaks in State Highways on numbered routes have been indicated as confusing to vehicle operators and more particularly so where the breaks have not been speed zoned by local officials. This authorization for the department to speed zone all numbered routes will not only be helpful to the motorists but will provide for continuity as well as uniformity in controls along our numbered route system.

3. AN ACT CLARIFYING THE PROVISIONS FOR ASSISTANCE TO CITIES AND TOWNS TO ELIMINATE ACCIDENTS AT HIGH-ACCIDENT LOCATIONS.

Chapter 519 of the Acts of 1967 inserted in Chapter 90 of the General Laws a new section which provided 75% state assistance to cities and towns in eliminating high-accident locations through the installation of suitable traffic control devices. This proposal revises the original Act by requiring the state to pay 100% of the cost.



LEGISLATION

4. AN ACT PROVIDING FOR THE ESTABLISHING OF TRAFFIC COMMISSIONS.

This proposal will creat a general enabling act which after local acceptance establishes a local traffic commission which will assume all traffic regulatory powers presently vested in city councils or boards of selectmen.

5. AN ACT CHANGING THE TITLE OF THE BUREAU OF SOLID WASTE DISPOSAL.

The purpose of this bill is to change the title of the Bureau of Solid Waste Disposal to better describe the functions of said bureau.

6. AN ACT RELATIVE TO PUBLIC INFORMATION CENTERS AT SAFETY REST AREAS.

The purpose of this bill is to authorize the Department to establish information centers at certain rest areas along state highways by entering into lease agreements providing for their construction, operation and maintenance. Information centers are planned for major highways entering the state and at certain internal locations important to tourism. This authorization will provide for the elimination of the cost of establishing information centers and reduce the cost of maintaing sanitary facilities.

7. AN ACT PROVIDING FOR WARNING DEVICES ON DUMP BODY TRUCKS.

The department is presently experiencing incident of damage to overhead highway signs by the accidental raising of a dump body without the knowledge of the truck operator. Such an accident besides causing extensive damage to highway sign structures, also presents extremely hazardous operational conditions to the



## LEGISLATION

### 7. (Cont'd)

traveling public when in the vicinity of the occurrence of such an accident. This bill would require periodic inspection of the proper operation of a warning light or device to notify the operator of a lifted dump body. The provisions of this bill would not become effective until just prior to the 1972 fall inspection.

### 8. AN ACT REQUIRING SECURE COVERAGE AND ENCLOSURE OF CERTAIN LOADS WHILE TRAVERSING THE WAYS OF THE COMMONWEALTH.

This bill would add to the present law which prohibits dropping or leaking loads, the further requirement that..."when said load consists of material that is loose or can become unbound"... it shall be ..."fully, adequately, and securely covered and enclosed. The bill also rewrites the second sentence which provides for dropping sand, water or other substances on the highway for maintenance purposes.

### 9. AN ACT INCREASING THE PENALTY FOR DISPOSAL OF GARBAGE OR REFUSE IN CONTAINERS ALONG HIGHWAYS, AND IN REST AREAS.

This bill provides for increasing the penalty for disposal of household or Commercial garbage or refuse in a container along the highway or in a rest area from \$50.00 to \$200.00.

## LAND TAKINGS

### 10. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ACQUIRE CERTAIN OTHER PUBLIC LANDS FOR HIGHWAY PURPOSES. (NATICK ROUTE 135)

### 11. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ACQUIRE CERTAIN OTHER PUBLIC LANDS FOR HIGHWAY PURPOSES. (SAUGUS ROUTE 129)





LEGISLATION

LAND TAKINGS (Cont'd)

12. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ACQUIRE CERTAIN OTHER PUBLIC LANDS FOR HIGHWAY PURPOSES. (DIGHTON ROUTE 138)
13. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ACQUIRE CERTAIN OTHER PUBLIC LANDS FOR HIGHWAY PURPOSES. (MARLBOROUGH ROUTE 85)
14. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ACQUIRE CERTAIN OTHER PUBLIC LANDS FOR HIGHWAY PURPOSES. (NEW BEDFORD ROUTE 18 - CITY CONNECTOR)
15. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ACQUIRE CERTAIN OTHER PUBLIC LANDS FOR HIGHWAY PURPOSES. (FAIRHAVEN ROUTE 6)

The above six Bills authorize the departments taking of other dedicated lands for highway purposes.



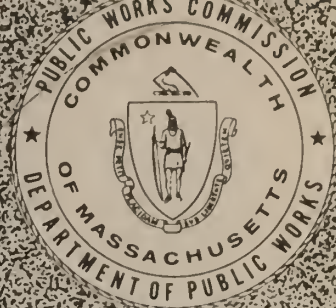




July 1, 1971 - June 30, 1972

MASS.

TC 20.1: 971-972



# annual report

MASSACHUSETTS  
DEPARTMENT  
OF PUBLIC WORKS

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**BRUCE CAMPBELL**  
COMMISSIONER

**PETER E. DONADIO**  
**THOMAS E. BARLOW**  
**MALCOLM GRAF**  
**JOHN G. WOFFORD**  
ASSOCIATE COMMISSIONERS

◀ **PUBLIC WORKS COMMISSION**







*The Commonwealth of Massachusetts*

*Department of Public Works*

*Office of the Commissioner*

*100 Nashua Street, Boston 02114*

December 1, 1972

His Excellency, Governor Francis W. Sargent  
and the Great and General Court of the  
Commonwealth of Massachusetts:

Gentlemen:

In accordance with Section 5 of Chapter 16, as  
amended by Chapter 821 of the Acts of 1963, I herewith  
submit the annual report of the Massachusetts  
Department of Public Works for the fiscal year ending  
June 30, 1972.

Very truly yours,

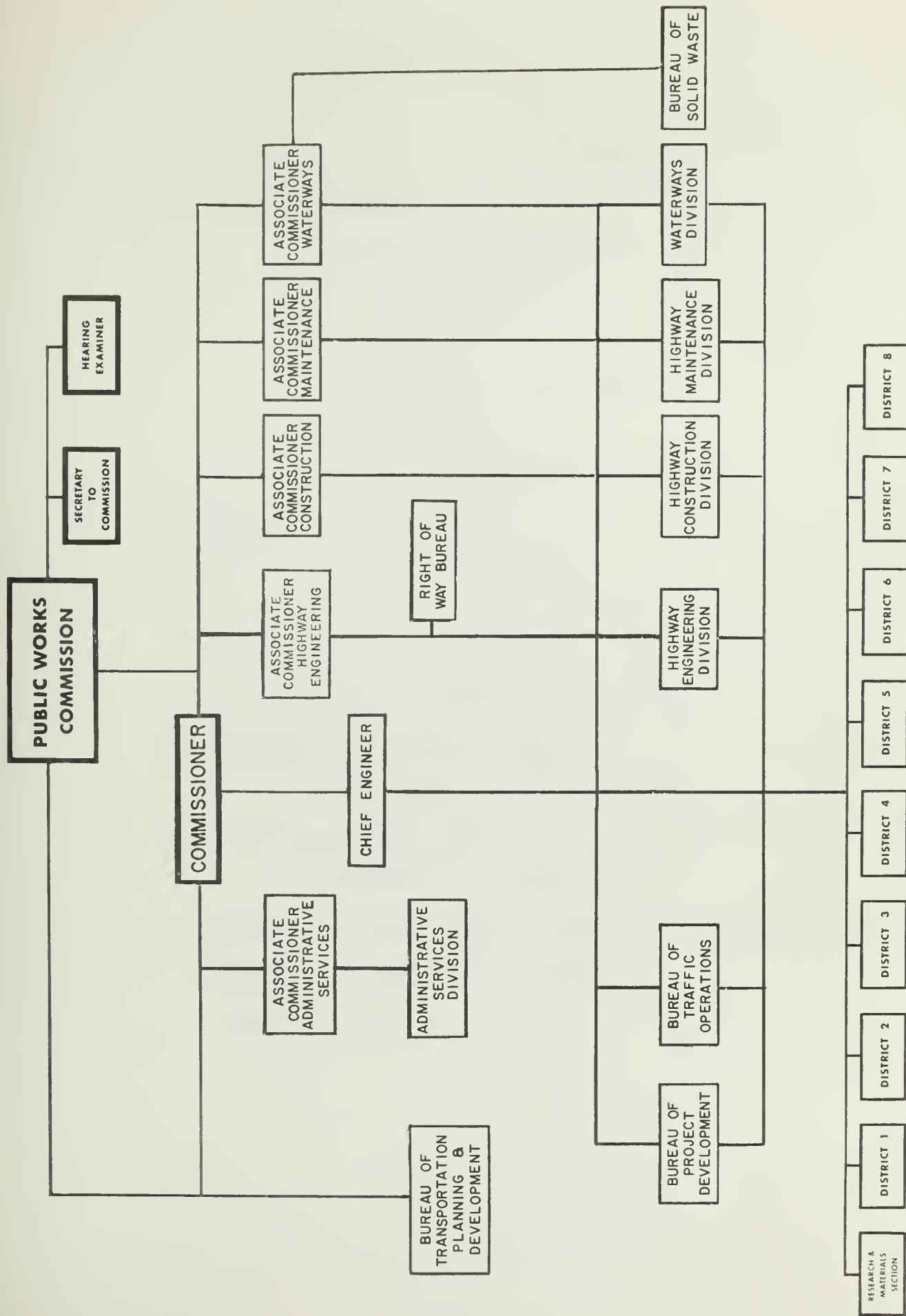
A handwritten signature in cursive script that reads "Bruce Campbell".

BRUCE CAMPBELL  
COMMISSIONER





MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS





## I N D E X

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- A. Division of Administrative Services
- B. Highway Engineering
  - 1. Highway Design Division
  - 2. Right of Way Bureau
  - 3. Bridge Section
  - 4. Traffic Engineering Section
  - 5. State Aid Section
  - 6. Research and Materials Section
- C. Highway Construction
  - 1. Construction Section
  - 2. Contract Engineer Section
  - 3. Final Review Section
  - 4. Procedures and Records Section
- D. Highway Maintenance Section
  - 1. Maintenance Section
- E. Division of Waterways
  - 1. Division of Waterways
- F. Bureau of Transportation Planning and Development
- G. Bureau of Solid Waste Disposal
- H. Legislation



A



## DIVISION OF ADMINISTRATIVE SERVICES

The major functional activities of the Division of Administrative Services (approximately 324 employees) are as follows:

1. Processing, reviewing, recording and reporting all financial transactions of the Department.
2. Processing and recording of all personnel actions.
3. Coordinating the preparation and administration of the Department budget.
4. General Services (Print Shop, Blue Print Shop, Micro-filming, Photography, Xeroxing, Mail Room and other general services to the Department).
5. Establishing and revising administrative procedures and systems.
6. Accident prevention and safety programs.
7. General secretarial activities for the Department.
8. Supervision of:
  - a. Public Works Building Security.
  - b. Public Works Building Operation and Maintenance.
  - c. Motor Pool Activities.

Appendix A presents organization chart and statement of responsibility for the Division and the sections thereof.

During Fiscal 1972, the Division continued its long-range effort to strengthen and streamline all functional operations, particularly in the general administrative and financial management areas.





APPENDIX A

Organization Chart

Statement of Responsibility

DIVISION OF ADMINISTRATIVE SERVICES



COMMONWEALTH OF MASSACHUSETTS  
DEPARTMENT OF PUBLIC WORKS  
STANDARD OPERATING PROCEDURES

S.O.P. No. ADM-01-35-1-000

PAGE 1 OF 1

SUBJECT

DIVISION OF ADMINISTRATIVE SERVICES - ORGANIZATION CHART

DISTRIBUTION

A

EFFECTIVE

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SUPERSEDES

PAGE 1 OF 1

APPROVED

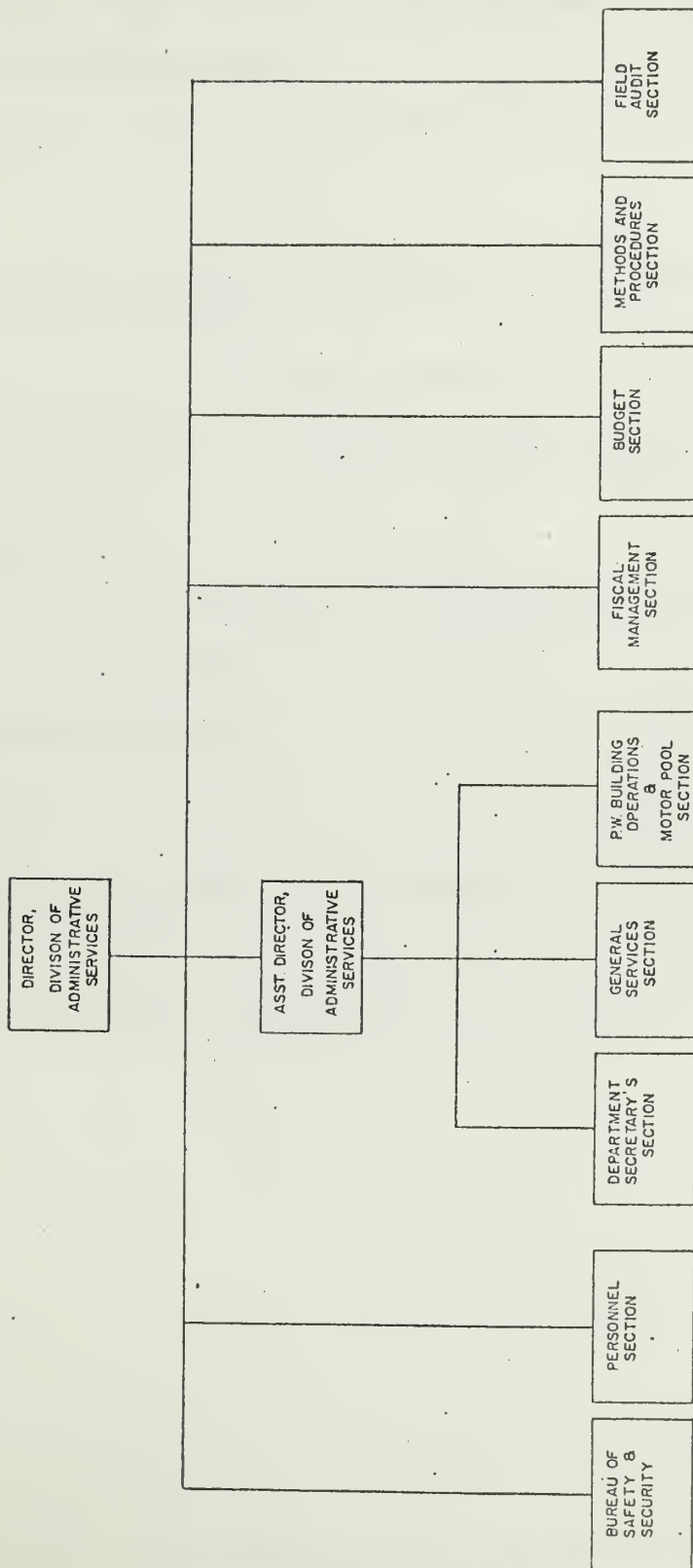
May 21, 1972

Sep. 27, 1972

S.O.P. No. ADM-01-35-1-000

EFFECTIVE March 15, 1969

*Ronnie Campbell*





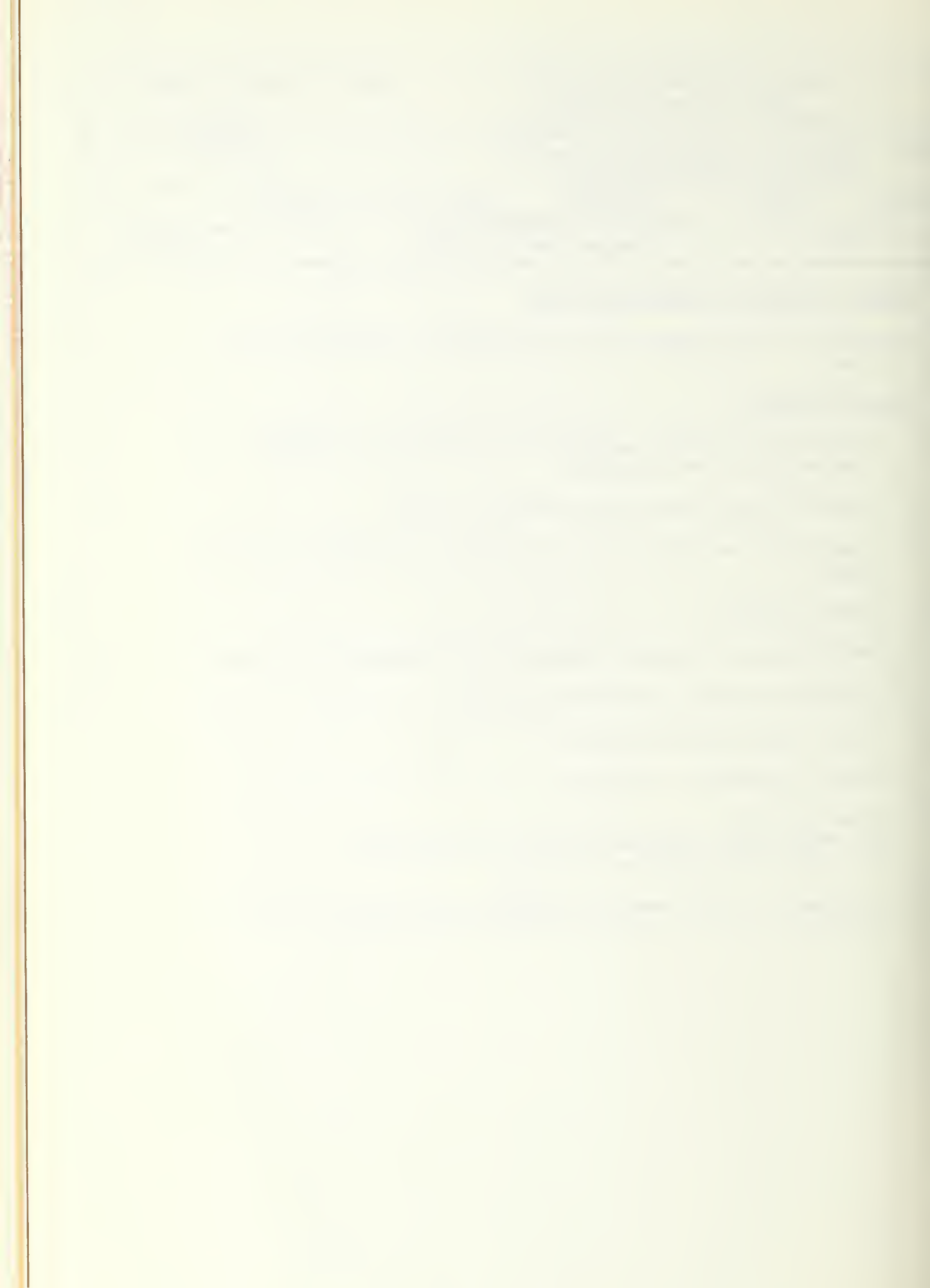
COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS <b>STANDARD OPERATING PROCEDURES</b>			S.O.P. No. ADM-01-36-1-000  PAGE 1 OF 1
SUBJECT DIVISION OF ADMINISTRATIVE SERVICES STATEMENT OF RESPONSIBILITIES			DISTRIBUTION A
EFFECTIVE May 21, 1972	ISSUED Sept. 27, 1972	SUPERSEDES PAGE 1 OF 1 S.O.P. No. ADM-01-36-1-000 EFFECTIVE March 15, 1969	APPROVED <i>Bruce Campbell</i>

SUMMARY STATEMENT OF RESPONSIBILITIES

Responsible for the administrative and financial activities of the Department.

MAJOR ACTIVITIES

1. Processing, reviewing, recording and reporting all financial transactions of the Department.
2. Processing and recording all personnel actions.
3. Coordinating the preparation and administration of the Department budget.
4. General Services
5. Establishing and revising administrative procedures and systems.
6. Accident prevention and safety programs.
7. Public Works Building Security
8. General secretarial activities
9. Supervision of:
  - a. Public Works Building Operation and Maintenance
  - b. Motor Pool Activities.
10. Auditing of utility company, railroad and consultant contract billings to ascertain their correctness and propriety.



**B**





# HIGHWAY DESIGN DIVISION

## SURVEYS, PLANS, ESTIMATES & FINAL SURVEYS

During the fiscal year ending June 30, 1972, preliminary surveys, plans estimates and final surveys were made as follows:

### FOR STATE HIGHWAY CONSTRUCTION

	<u>Cities</u>	<u>Towns</u>	<u>Miles</u>
Preliminary surveys	10	19	57.6
" Plans	6	18	10.7
" Estimates	10	12	19.7
Final Surveys	2	10	23.3

### FOR STATE HIGHWAY RECONSTRUCTION

Preliminary Surveys	18	29	88.9
" Plans	9	28	75.3
" Estimates	16	33	58.6
Final Surveys	2	4	7.5

### FOR CHAPTER 81

Preliminary Surveys	0	2	1.4
" Plans	0	2	1.4
" Estimates	0	171	9237.1
Final Surveys	0	0	0

### FOR CHAPTER 90

(Advertised & Unit Price)

Preliminary Surveys	20	33	54.1
" Plans	27	28	38.0
" Estimates	17	25	25.5
Final Surveys	3	10	8.0

### FOR CHAPTER 90 CONSTRUCTION

(Force Account)

Preliminary Surveys	6	103	85.9
" Plans	4	99	71.6
" Estimates	10	179	175.7
Final Surveys	0	0	0

### FOR CHAPTER 90 (Maintenance)

Preliminary Surveys	3	10	1.5
" Plans	0	6	5.0
" Estimates	1	215	929.3
Final Surveys	0	0	0



# HIGHWAY DESIGN DIVISION

## FOR ROADSIDE DEVELOPMENT

	<u>Cities</u>	<u>Towns</u>	<u>Miles</u>
Preliminary Surveys	0	0	0
" Plans	2	2	4.0
" Estimates	6	15	37.0
Final Surveys	0	0	0

## FOR ACCIDENT PRONE

Preliminary Surveys	11	26	52.6
" Plans	7	37	19.8
" Estimates	15	48	47.2
Final Surveys	0	1	0.1

## FOR RECONSTRUCTION SUB-STANDARD BRIDGES

Preliminary Surveys	2	14	7.1
" Plans	2	8	2.8
" Estimates	5	10	2.9
Final Surveys	0	7	1.3

## NOTE:

No Landscape & Scenic Enhancement Projects

No Control of Junk Yards Projects

No Topics projects included - to be submitted by

Bureau of Traffic Operations



# HIGHWAY DESIGN DIVISION

## GEODETTIC SURVEYS

### Field Work

Second Order Traverse	140 miles
Second Order Levels	60 miles
Control Monuments Recovered	800 points
Control Monuments Reported Destroyed	200 points
Geodetic Positions Established	200 points
Geodimeter Measurements	240 miles

### Office Computations

Second Order Traverse computation	200 miles
Second Order Level computation	10 Miles
Highway traverse computed	120 miles
Highway Bound Points - coordinates computed	2,600 points
Geographic Positions computed	3,500 points
Town lines computed	60 lines

### Office (Misc.)

Control plotted on Topo Maps	4,000 sq. miles
Requests for survey control (by phone, mail or walk-in)	600
Requests for other survey information or advice	300

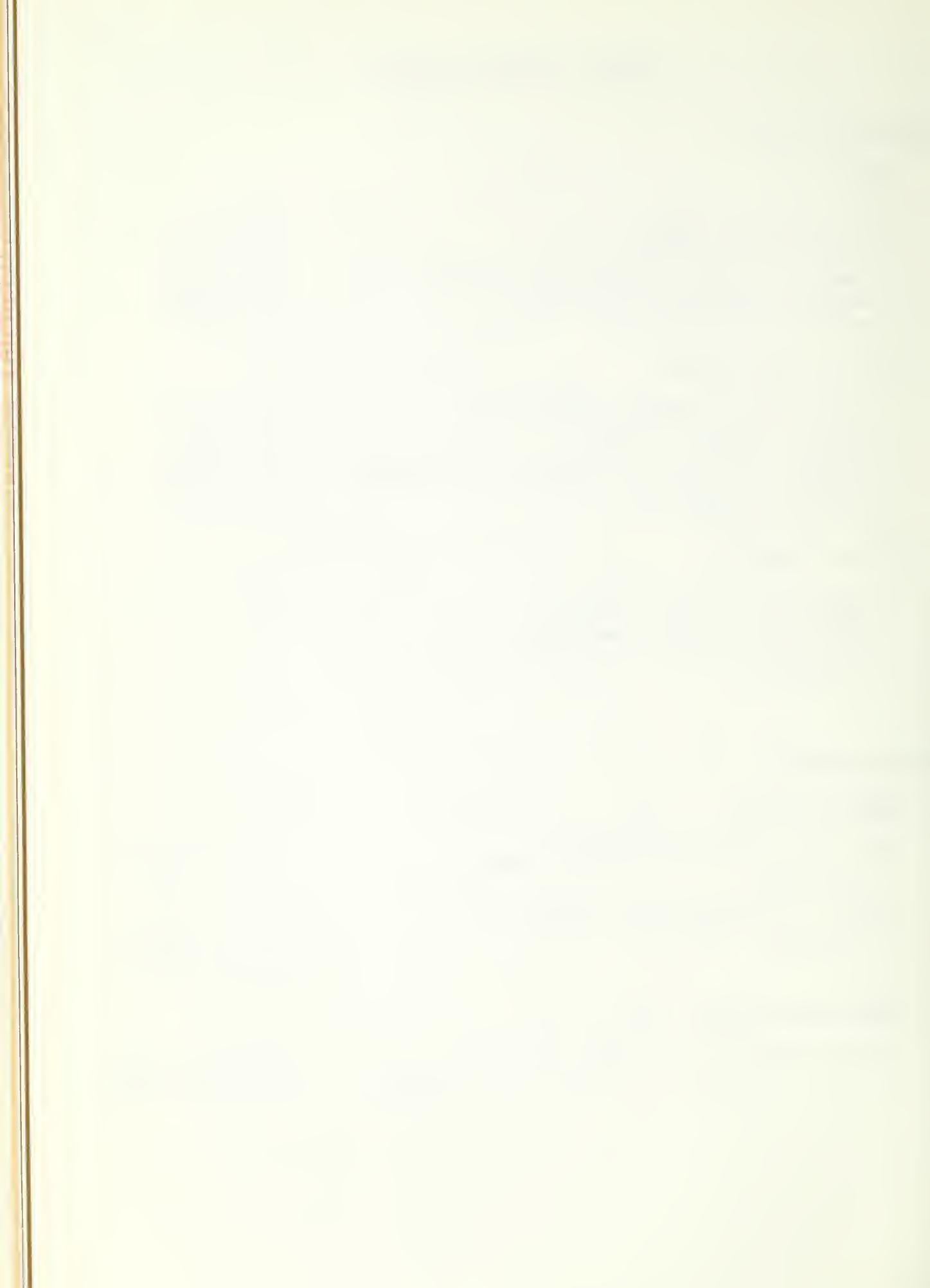
## AERIAL SURVEYS

### Reconnaissance      Scale 1"=200'

Rte. 20, Pittsfield-Hancock	5.4 sq. miles
Rte. I-95, Rte. 1 Corridor, Revere to Lynnfield	6.9 sq. miles
Rte. 10, Southwick-Southampton	27.1 sq. miles
Route I-95 Connectors, Beverly-Danvers- Peabody	10.7 sq. miles
TOTAL	<u>50.1 sq. miles</u>

### Preliminary Plans      Scale 1"=40'

Bypass Road, U. of Mass., Amherst	0.73 sq. miles
Rte. 8 Connector, Pittsfield-Lanesborough	0.49 sq. miles
TOTAL	<u>1.22 sq. miles</u>



HIGHWAY DESIGN DIVISION

AERIAL SURVEYS (Cont'd)

<u>Record Plans</u>	Scale 1"=40'	
Rte. I-495, Foxborough-Franklin		9.5 linear miles
Rte. 3, Burlington-Chelmsford		11.0 " "
Rte. I-95 & I-495, Merrimac-Salisbury		20.0 " "
	TOTAL	<u>40.5 linear miles</u>

Miscellaneous

Handling of Aerial Photographs

- a. For individuals to view and obtain permission to purchase copies.
- b. For loan to Department personnel and other State Agencies.

Furnishing prints of 200 scale mapping for Department personnel, consultants and other public agencies.





HIGHWAY DESIGN DIVISION

THE COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF PUBLIC WORKS

LENGTHS OF STATE HIGHWAY LAID OUT FROM

JULY 1, 1971 to JUNE 30, 1972

STATE HIGHWAYS

11.735 additional miles of State highway were laid out  
in 1 City and 6 Towns.

2 Sections of State highway were abandoned in 2 Towns  
for a total of 3.629 miles.

3 Sections of State Highway were discontinued in  
3 Towns for a total of 1.118 miles.

2 Sections of State highway were transferred in  
1 City for a total of 2.698 miles.

20 State highway alterations involving no additional  
mileage were made in 7 Cities and 13 Towns.

2 Bridge locations taken in accordance with the  
provisions of Chapter 690 of the Acts of 1945, altered and  
laid out as State highways in 1 City and 1 Town.

The total length of State highway location on  
June 30, 1972 was 2662.856 miles.

ORDERS OF TAKINGS

64 Advance Order of Takings in 7 Cities and 9 Towns  
were prepared for proposed State highway locations, 20  
being taken in the City of Boston.

5 Maintenance Areas were taken in 5 Towns.

1 Rest Area was taken in 1 Town.

1 Parking Area was taken in 1 City.

1 Order of Taking in behalf of the Department of Youth  
Services.



RIGHT OF WAY BUREAU

Right of Way activities for Fiscal Year 1972 Statewide were very extensive although the Highway Moratorium was still in effect within the area of Route 128.

The implementation of the 1970 Federal Highway Act as required by July 1, 1971 curtailed right of way acquisitions on Federally Aided Projects until formal assurances could be given to the Federal Highway Administration that the Department was able to comply with the 1970 Act. These assurances were provided in November 1971.

As a direct result of the Highway projects for Fiscal Year 1972 it was necessary to obtain Title Examinations on 767 properties. It was further required that 468 Title Rundowns be made on properties involved in Land Takings.

During 1972 Fiscal Year 531 Staff Appraisals were prepared and 119 Fee Appraisals secured. In addition the lease value of State-owned land was determined on 12 properties. The Appraisal Review Section reviewed a total of 484 Staff Appraisals and 163 Fee Appraisals, in addition established the lease value of State-owned land on 12 properties. The Review Section further reviewed appraisals on 11 Blocks, acquired by the New Bedford Redevelopment Authority, having a valuation of \$1,040,000.00.

The Massachusetts Real Estate Review Board took action on 110 cases. They also set the amount to be reimbursed by the New Bedford Redevelopment Authority for the 11 blocks they acquired for the Department in connection with the construction



RIGHT OF WAY BUREAU

of the New Bedford Downtown-Connector Highway.

11.735 additional miles of State highway were laid out in 1 City and 6 Towns.

2 Sections of State highway were abandoned in 2 Towns for a Total of 3.629 miles.

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64 Advance Order of Takings in 7 Cities and 9 Towns were prepared for proposed State highway locations, 20 being taken in the City of Boston.

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1 Parking Area was taken in 1 City.

1 Order of Taking in behalf of the Department of Youth Services.

Overall 1,026 parcels of land were acquired for Highway purposes during Fiscal Year 1972 at a total cost of \$5,148,660.00.



RIGHT OF WAY BUREAU

ORDERS OF TAKINGS (CONT'D)

In addition the Attorney General's Office settled 156 cases for an additional \$4,976,200.00 bringing the total land acquisition cost for the Fiscal Year to \$10,124,860.00.

The Negotiation Section made offers in 524 cases. Negotiators also rendered assistance to the Land Damage Payment Section which processed 398 payments to property owners during the Fiscal Year, in 175 cases a final settlement was obtained with the property owners.

Replacement Housing additives were computed for 65 Residential owner-occupied families and Rent Supplement additives were computed for 120 Residential occupants. In addition, 79 Replacement Housing additives and 203 Rent Supplement additives had to be recomputed because of the increased benefits entitled to relocatees under the 1970 Federal Highway Act.

During Fiscal Year 1972 Land Takings affected 88 families and 12 businesses. In this period 144 families were relocated and 38 businesses moved to new quarters.

One-hundred and forty moving cost claims both residential and business were processed during the Fiscal Year involving a total amount of \$479,302.00. Eighty-seven replacement housing allowance claims totalling \$341,148.00 (Average \$3,900.), One-hundred eighty-one rent supplement claims totalling \$141,340.00 (Average \$780.) and twenty-nine dislocation allowance claims totalling \$2,900.00 (Average \$100.) were processed during Fiscal Year 1972. A total of 437 business and residential relocation





RIGHT OF WAY BUREAU

ORDERS OF TAKINGS (CONT'D)

claims were processed in Fiscal Year 1972 and the total relocation cost was \$964,490.00.

Relocation services rendered by Contract Agents in Boston reflected a fiscal outlay of \$147,600.00.

The Advance Acquisition Section processed 38 cases in the Fiscal Year 1972.

Only one of these cases were taken by the Department in the public interest to prevent land development within a proposed highway corridor. The remaining 37 cases were taken after the Department had received a hardship request by the owners, in writing.

The thirty-eight properties taken included twenty-nine residential properties, five business properties and four parcels of vacant land.

The total value of the properties acquired in Fiscal 1972 under the Advance Acquisition Program was in excess of \$1,350,000. At the end of the 1972 Fiscal Year there were ninety-three cases under consideration for advance acquisition throughout the Commonwealth.

Property Management activities of the Bureau were extensive during Fiscal Year 1972, as can be seen from the following figures:

During the year fiscal 1972, rentals under the Property Management Section of the Right of Way Bureau grossed \$226,471.63 with a net income after expenses of \$95,116.24. Sales of principal



RIGHT OF WAY BUREAU

structures and improvements yielded \$39,887.59 and sales of land brought \$2,180.00. Parking area leases produced \$35,234.01.

Additional leases netted \$184,884.60 bringing total net receipts to \$357,302.44 for fiscal 1972.

During the year, 110 structures were acquired, of which 92 were residential and 18 were commercial.\*

During the same year, 98 were vacated and 89 structures were released for demolition.\*\*

\* A total decrease of 43% over fiscal 1971, with a decrease of 46.2% in residential and a 18.2% decrease in commercial buildings.

\*\* An increase of 22.5% vacated over fiscal 1971 and an 8.2% decrease for demolition.

	Comparison for fiscal <u>1971</u>	<u>1972</u>
Grossed Rental income	\$178,433.00	\$226,471.63
Net Income after expenses	21,731.14	95,116.24
Sales of Structures	31,411.60	39,887.59
Sales of Land	7,077.00	2,180.00
Parking area leases	47,097.61	35,234.01
Additional leases	209,411.06	184,884.60
Total Net Income	<u>\$316,728.41</u>	<u>\$357,302.44</u>

During Fiscal Year 1972 the Bureau's Federal Highway Administration Liaison and Compliance Section submitted reclaim vouchers under the Audit Deduction Program in the amount of \$131,875.00.

Ineligibility findings by the Federal Highway Administration in the amount of \$519,805.95 were resolved in favor of the Commonwealth.



RIGHT OF WAY BUREAU

Unresolved claims against the Federal Highway Administration under the Meredith and Grew Incorporated Contract No. 9107 in the amount of \$1,137,949.00 were referred to the State's Attorney General who will attempt to resolve this matter through discussion rather than by litigation.

In addition to routine meetings held with the Federal Highway Administration, many meetings were held relative to the Outdoor Advertising Sign Removal Program Policy for 1972 and the procedures to be followed on this activity.

The following represents the activities of the Attorney General Liaison Section, for the Fiscal Year 1972.

Number of cases requested by the Department of the Attorney General totalled 77.

This Section also prepared eleven (11) legislative bills which were introduced and heard by the 1972 Legislature. There were approximately 20 other Department of Public Works' bills for which the Section prepared written reports and appeared either for or against at various Legislative Committee hearings.

During Fiscal Year 1972 the Right of Way Bureau's Training Program for its employees continued to operate in a smooth and efficient manner. One hundred and seventy (170) of our personnel participated in courses of training given during fiscal 1972.

The breakdown is as follows:

Fourteen (14) attended and successfully passed the Bureau's 8 week training program as prescribed in Training Bulletin #3.



RIGHT OF WAY BUREAU

- Thirty-eight (38) attended and graduated from the Right of Way Institute, Suffolk University, Boston, Mass., where they participated in Advanced Courses in Real Estate Acquisition, Real Estate Appraising, Relocation Assistance, Eminent Domain Law, Preliminary Engineering and Property Management.
- Twenty-three (23) attended the New England Law Institute Seminar on "Municipal Law" in Boston, Massachusetts.
- Forty (40) attended the Right of Way Academy held at the Arlington and Worcester District Offices where they participated in special basic courses in Real Estate Acquisition, Real Estate Appraising, Relocation Assistance, Eminent Domain Law, Preliminary Engineering and Property Management.
- Fifty-five (55) attended two preparation courses for coming Civil Service examinations conducted by the Bureau at the 4th Floor Auditorium of the Massachusetts D.P.W. at 100 Nashua Street, Boston, Massachusetts.





BRIDGE SECTION

During the period from July 1, 1971 to June 30, 1972, the Department advertised for bids for construction and alteration, sixty-eight (68) bridges, culverts and walls. These structures were either designed or processed through the Department's Bridge Section.

These structures were located in thirty cities and towns throughout the Commonwealth and cost approximately \$26,000,000.

Twenty of these structures were on the safety project for the alterations and reconstruction of Interstate Route 93 in Medford, Methuen, Reading, Stoneham and Woburn.

Six of the structures were in the widening of Route 128 in Burlington and Woburn.

There were nine new structures for Relocation Route 6 in Fairhaven and New Bedford and six new structures for Interstate Route 95 in Peabody.

Six structures on Route 291 in Springfield had protective screening placed on them.

Four of the major structures were for Rutherford Avenue and Prison Point Bridge in Boston, the Plum Island Bridge in Newbury and the widening of the bridge over the Merrimac River on Interstate Route 93 in Andover-Methuen.

The remaining seventeen structures were for various TOPIC State Highway and Chapter 90 projects.



### BRIDGE SECTION

Nineteen (19) boring contracts were advertised during this period at a cost of approximately \$425,000.

The Department has made preliminary studies and has initiated work on bridges at the following locations:

Fitchburg, Leominster, Westminster - Route 2

Gill and Greenfield - Route 2

Concord, Lincoln, Lexington - Route 2

Lancaster, Leominster, Sterling - Route 2

Lanesboro and Pittsfield - Route 2

Sterling and West Boylston - Route 52

Ware and West Brookfield - Route 9

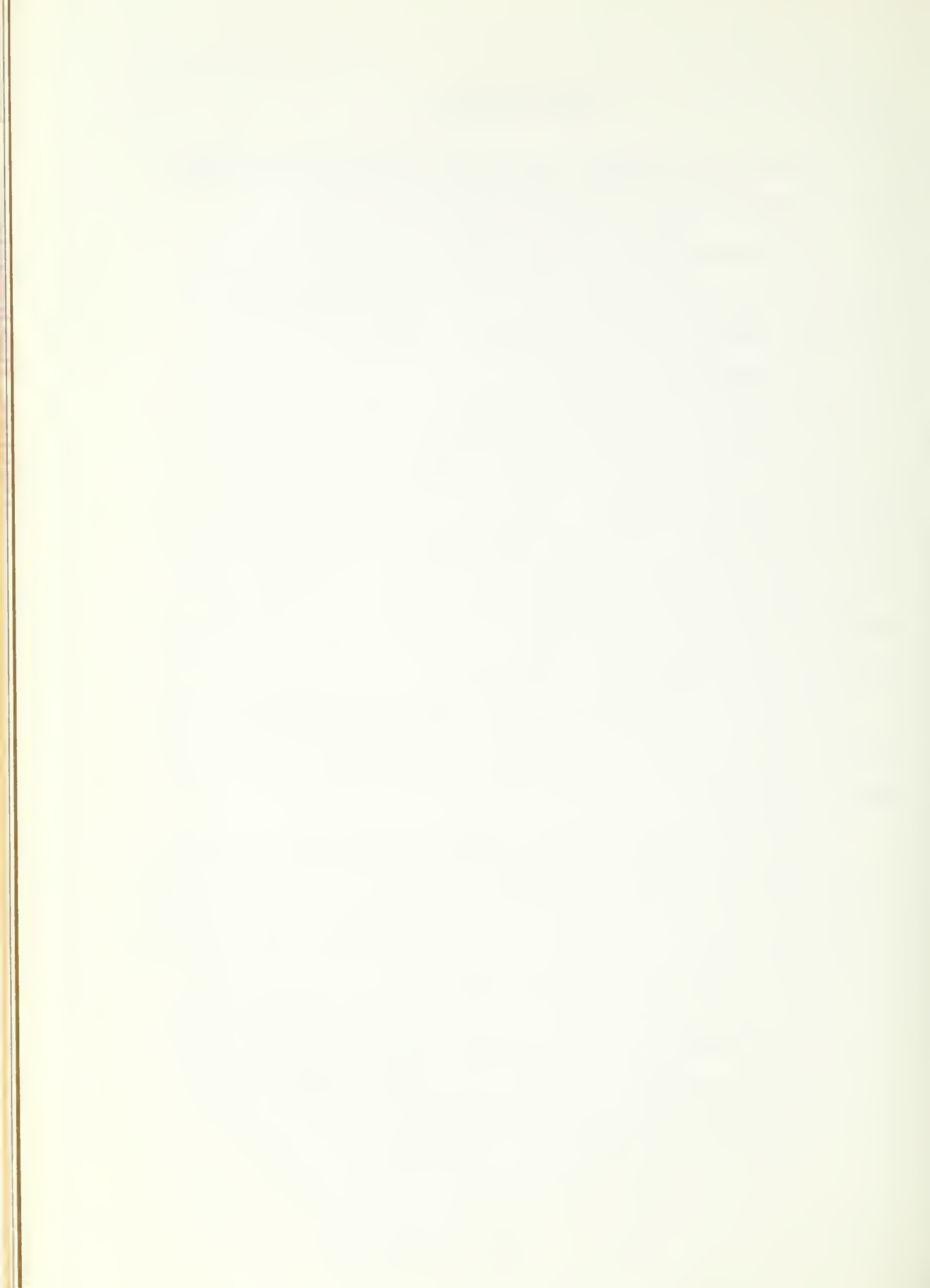
Sutton and Uxbridge - Route 146

Foxborough to Bridgewater - Route 25.

During the fiscal year, 1972, the Bridge Division has designed, reviewed and processed \$1,263,200 worth of signs.

### METAL CONTROL UNIT

The Metal Controls Unit continued surveillance of fabricators previously approved quality assurance programs by direct communication and inspection services. Contracts for inspection service were entered into after negotiations, with the Pittsburgh Testing Laboratory, Jersey Testing Company and Arnold Green Company. Inspection areas were throughout the United States and Canada. Inspectors were assigned on the basis of required expertise and geography.



METAL CONTROL UNIT, (Cont'd.)

The Unit conducted qualification tests of ultrasonic technicians, reviewed welding procedures for approval and witnessed welder and welding procedure qualifications tests. The Unit also is in constant contact with State-of-the-Art of non destructive testing and weld technology. This period also required in-depth studies of vibrating cyclic fatigue failures and the effects of aluminum inclusions in killed steel. Continuing also is the advisory relationship for the Construction, Maintenance and Traffic Sections. Information relative to corrosion determination, weld efficiency and design application have been made available to these Sections..



## TRAFFIC ENGINEERING SECTION

Traffic engineering is defined by the Institute of Traffic Engineers as, "that phase of engineering which deals with the planning, geometric design and traffic operations of roads, streets and highways, their networks, terminals, abutting lands and relationship with other modes of transportation for the achievement of safe, efficient and convenient movement of persons and goods."

Over the past three decades, every aspect and function comprising this definition has experienced a continuously increasing rate of growth. The vital statistics for these aspects and functions for fiscal '72 were no exception, in that all trend based projections were satisfied. This inclination indicates the enormous extent to which our nation has come to rely on highway transportation. The many implications of these aspects and functions as they relate to this highway oriented society of ours will become very apparent after reading the activities and responsibilities of the Units of this Section, as reported below for fiscal '72.





## TRAFFIC ENGINEERING SECTION

### TRAFFIC OPERATIONS & SAFETY UNIT

#### TRAFFIC RECORDS PROJECT

The Accident Unit together with the Data Processing Section continued the development of the Department's Accident Records System.

Additional programs which were written, tested and are now operational have given the Department the capability to identify those areas on the State Highway System which are experiencing a high incidence of night accidents and those experiencing a higher than average incidence of skidding accidents.

A major refinement during the year was the development of a system to identify all high accident locations on State Highways. This now presents to the Department an additional tool for the establishment of priorities for locations to be improved through safety projects. This also provides to management a more realistic picture as to where expenditures of funds for projects should be channeled.

All divisions of the Department, as well as consultants, have made extensive use of accident data generated by the Accident Records System.

Projects which are under consideration are the development of a model to predict accidents and the use of the Department's plotter to assist in the plotting of accident diagrams.

#### ACCIDENT UNIT

The Accident Unit has among its major responsibilities the continual development and maintenance of the Computerized Traffic Accident Records System. During this year the techniques in investigations of fatal accidents were refined. Each fatal accident occurring on the State Highway System is investigated in-depth by Department



ACCIDENT UNIT (cont'd)

engineers. Particular emphasis is given to the roadway and its possible relationship to the fatal accident.

The Department also published its sixth annual report of "State Highway Fatal Motor Vehicle Accidents." As in the past, the publication is a statistical presentation of all factors involved with fatal accidents which have occurred on the State Highway System.

During this year the Unit developed a format of accident projections. This data developed through this method is being used as additional input for the Department's Environmental Impact Statements. The format is currently being used by Department engineers and consultant firms.

B. U. LAW - MEDICINE RESEARCH PROJECT

During the past fiscal year the Traffic Engineering Section continued its participation in the Boston University Multidisciplinary Traffic Accident Research Project. The mission of the group is to conduct in-depth investigations of fatal traffic accidents in the Metropolitan Boston area.

This Section contributed highway engineering expertise to the medical, automotive and psychological phases of the project. At a monthly meeting of all disciplines, individual cases were reviewed and recommendations and suggestions were discussed as to how safety measures could be utilized now and in the future.

This project has been funded by a Federal grant from the Department of Transportation and has recently received authorization to continue for two more years.



TRAFFIC ENGINEERING SECTION

EXCLUSIVE BUS LANE - SOUTHEAST EXPRESSWAY

After approximately one year of planning the Department instituted the exclusive bus lane on the Southeast Expressway in May 1971. Initially the demonstration was conducted to determine the feasibility of such an operation. The experiment terminated in November of 1971.

Termination was necessary due to reduced daylight hours and the onset of winter weather.

Data gathered during the period of May 1971 to November 1971 was evaluated and it was determined that the demonstration illustrated that the scheme of a reversible bus lane on the Expressway had definite potential to reduce traffic and improve flow on the Southeast Corridor.

The bus lane was resumed in May 1972 and is now considered to be an operational item for the Department.

A report detailing the demonstration was published and was distributed nationwide.

CHAPTER 90, SECTION 33B

The Department's safety program for the elimination of accidents at high accident locations under Chapter 519, Acts of 1967, was officially terminated on March 31, 1972.

In summary this program provided assistance to the communities of Massachusetts by reimbursing three-fourths ( $3/4$ ) of the cost of installing traffic control devices at intersections selected by the municipalities.

In all but a few cases, the types of improvements provided for the installation of traffic signals.





TRAFFIC ENGINEERING SECTION

CHAPTER 90, SECTION 33B

Eligibility for this program extended to all 351 communities of the Commonwealth. Of these communities eligible, 44 participated in this Safety Program of which 35 were eligible for the TOPICS Program. It should also be noted that many communities who requested project approval under the 519 Program (approximately 1.1 million dollars in project estimates) had these projects transferred to the TOPICS Program. The 44 communities constructed 54 safety projects which resulted in the State reimbursing the communities \$962,843.25.

On November 4, 1971, Governor Sargent signed into law the supplemental budget which included an item of \$1,000,000. for extending the Department's Safety Program as outlined under Chapter 519.

Additional legislation was filed for changing the reimbursement from 75% to 100% of the cost for these improvements. On March 10, 1972, Chapter 87 was signed into law by the Governor which now provides for 100% reimbursement.

The Department has been attempting to establish this program on a continuing basis as a more effective instrument for reducing accidents on our local roadways.

The response from the municipalities for participation in this Program has been encouraging. Preliminary project requests total approximately \$600,000.

CHAPTER 616, SECTION 6 ACTS OF 1967

Under the provisions of Chapter 616, the Traffic Engineering Section has administered the installation of School Zones. One hundred percent (100%) of the cost of this installation is reimbursed to the local community. This Program provides for the installation of a special flashing sign that establishes a legal speed limit of 20 M.P.H.





TRAFFIC ENGINEERING SECTION

CHAPTER 616, SECTION 6 ACTS OF 1967

during certain time periods while school children would be going to and from school.

This Program, since its inception in 1967, has expended the following amounts from the total of \$3,000,000. allotted.

<u>Year</u>	<u>Amount</u>	<u>No. Zones Installed</u>
1967	-	--
1968	3,413.00	1
1969	37,111.42	10
1970	174,799.40	55
1971	110,258.30	35
1972	<u>125,064.40</u>	<u>34</u>
(Total)	\$450,646.52	135

At the present time we have 181 additional School Zone projects in various stages of implementation at an estimated cost of \$630,000.

TOPICS

As was predictable, participation in the TOPICS Program has increased significantly over the past year.

Of the 186 communities now eligible for aid under TOPICS, 150 have indicated an interest in participating; of these 137 have signed the TOPICS agreement which will gain for them their first tangible results in the form of an areawide plan. At the other end of the spectrum, approximately 30 projects have reached the advertising stage with many proposals now at various levels of development between these two extremes.

In addition to the 20 or so projects scheduled to be advertised this summer, an urban system is being developed as an extension of TOPICS which will offer further assistance to the communities in improving their street networks.



TOPICS (cont'd)

A few TOPICS projects have now been completed and it is expected that after a suitable period of operation an effective program of "after" evaluation will be instituted as is provided in PPM 21-18.

The role of the Traffic Engineering Section continues as reviewer of these many TOPICS projects through all stages of their development and the extent of this function is reflected in the growing number of active proposals.

And as more and more projects near completion we are faced with the additional burden of meeting a rigid and rather impressive advertising schedule which allows one week for the review of and comment on 100% plans.

The TOPICS Program has been assigned a high priority, however, so that we can continue to meet our commitment in that area.

SPEED CONTROL UNIT

A priority schedule for Speed Control Operations was continued in the fiscal year 1971 - 1972. Comprehensive engineering studies for each highway tested were employed using radar speedmeters to measure vehicular speeds, ball bank indicators to test each horizontal curve encountered and trial runs to evaluate the practicality of the maximum safe speed.

Fifty-one Special Speed Regulations were approved jointly by the Department and the Registry of Motor Vehicles on State Highways, representing a total of 365.42 miles. Eighty-two Special Speed Regulations were approved by the Department and the Registry of Motor Vehicles on 230 city and town ways.

Technical traffic engineering advice was given to twenty-seven municipalities to aid them in their preparation to obtain Special



SPEED CONTROL UNIT (cont'd)

Speed Regulations.

In an effort to provide a greater continuity of Speed Zoning on numbered routes, which are under the control of a city or town, the Unit instituted a program of furnishing all engineering and signing with regard to Speed Zoning on numbered routes at no cost to the cities and towns.

REGULATIONS SECTION

The primary continuing function of this Section is to assist municipalities in adopting and amending traffic regulations, reporting to the General Court on proposed legislation involving traffic controls and representing the Department in response to court summonses.

This year has seen the publication of a new national Manual on Uniform Traffic Control Devices. The Department intends to adopt this Manual as the State Manual to the fullest extent possible.

A committee consisting of all units of the Traffic Engineering Section was formed and the Manual was reviewed completely at weekly meetings.

The Regulation Section was represented at every meeting. A number of control measures were noted which call for devices which could not be utilized under the provisions of existing Statute Law or which would require revisions in our standard regulations to allow for enforcement.

Consequently, this Section drafted revisions in both Statute Law and in the Rules and Regulations for Driving on State Highways which are now under consideration to effect compliance with the new standards. This activity is directly related to such Federal-Aid Projects as the TOPICS and Urban System Programs. All Traffic Control





REGULATIONS SECTION (cont'd)

Agreements necessitated by these programs must be examined by this Section for correctness.

It had been observed for sometime that Department standards for approval of the restriction of heavy commercial vehicles by municipalities should be reviewed because of changing conditions of traffic operations and volumes. This was done and a recommended updating of these standards was voted by the Commission.

Issuance of the usual Traffic Permits continued at an even pace with one rather notable exception. The number of School Zone Permits showed an increase of one hundred percent over the previous year and the number of recent applications indicate that this trend will continue.





TRAFFIC ENGINEERING SECTION

TRAFFIC SIGNS AND PAVEMENT MARKINGS UNIT

I. Operational Summary:

A. Signing

1. Contract - Design and/or review of signing on construction and reconstruction projects awarded under bid contracts.
2. Force Account - Design and/or review of new or replacement signing totally on an in-house basis.
3. Experimental Signing
4. Special Signing
5. Sign Processing

B. Pavement Markings

1. Contract - Review of markings designed by others on construction and reconstruction projects awarded under bid contracts.
2. Force Account - Design and detail undertaken entirely by Department forces.

C. Specifications and Standards - Prepared by this unit for signs and markings on all projects.

D. Route Changes and Route Description

E. Miscellaneous



TRAFFIC ENGINEERING SECTION

TRAFFIC SIGNS AND PAVEMENT MARKINGS UNIT (CONT'D)

II Signing

During the fiscal year the Unit has handled a volume of work encompassing all projects designed by the Highway Design Section, District Project Offices and consultant engineers under contract to the Department. The money value of signing on these projects is approximately \$4,750,000.

The Unit is responsible for designing, signing and/or reviewing designs of others, for directing the motorists to geographic areas serviced by the State Highway System.

Force Account Signing on in-house projects were designed and/or reviewed by this unit on about 200 individual projects throughout the Commonwealth. The money value for these projects would be approximately \$300,000.

The unit has reviewed over 30 TOPICS projects the past year of which signing and pavement markings have been major features. 20 more projects are scheduled to be advertised this summer.

Experimental signing this past year consisted of evaluation of diagrammatic signing on a limited basis. The latest location where the diagrammatic was incorporated was at the Route 2 interchange at Route 111 in Athol as part of a Safety Signing and Lighting Contract. Experimental signing on high intensity sheeting and legend sizing on Routes 9 and 30 in the Wellesley-Weston area is still being evaluated.



TRAFFIC ENGINEERING SECTION

TRAFFIC SIGNS AND PAVEMENT MARKINGS UNIT (CONT'D)

II Signing (cont'd)

The special signing phase of our operations has been devoted to the development of graphic signing as an aid to the motorists. In addition, to incorporating the Standard graphic signs of the recently adopted Federal Manual on Uniform Traffic Control Devices, this unit has also assisted in the development of graphic signing to major generators such as the Boston Aquarium, Foxboro Stadium, New Bedford Whaling Museum, MBTA Parking, Edaville Railroad etc. that have qualified for Activity Signs under our current Sign Policy.

Because of the high influx of requests for Activity Signs and Services Signs, the Sign Processing Sub-Unit has processed more than double the amount of Sign Orders than the previous year. Production has temporarily been retarded due to the Wellesley fabrication equipment change-over.

III Pavement Marking

During the fiscal year the Pavement Marking Sub-Unit has reviewed the multitude of projects designed by others and have designed a variety of Department projects. The majority of these projects were designed according to the new national standard as set forth in the new Manual on Uniform Traffic Control Devices. This, of course, included the yellow pavement marking for two-way traffic and restrictive median strips. In keeping with the trend and where traffic volumes warranted their use, thermoplastic markings have been



TRAFFIC ENGINEERING SECTION

TRAFFIC SIGNS AND PAVEMENT MARKINGS UNIT (CONT'D)

IV Specifications and Standards

In conjunction with the preparation of Department projects either by consultants or in-house forces, this unit prepares and reviews standards and specifications for Traffic Signs and Supports and Pavement Markings. The basic specifications are contained in Section 825 of the Department's Standard Specifications.

Individual projects require special provisions to cover specifics which cannot be included in a general specification. They are written by this office on a project basis as the need arises.

Additionally the Unit is actively involved in the development of new and revised standards for sign supports and breakaway sign posts in order to present prospective, bidders and Department designers with comparison data for their individual purposes.

V Route Changes & Route Descriptions

A secondary function of this unit is to provide and maintain a complete and up-to-date record of Route Descriptions which include route length, description and location of termini, turns, major landmarks and overlaps with other routes.

New construction, relocations, reroutings are included in this constantly changing route system for the Department.

Route changes are also handled through this office. During the fiscal year, the following is a list of the significant Route Changes:

Route 140 - Relocated in Gardner-Westminster  
for evaluation





TRAFFIC ENGINEERING SECTION

TRAFFIC SIGNS AND PAVEMENT MARKINGS UNIT (CONT'D)

V Route Changes & Route Descriptions

U.S. Route 20 - relocated in Springfield

Route 20-A shortened in Springfield

Route 142 - relocated in Northfield

Route 116 - removed from Springfield

Route 118 - relocated in Swansea

The Metropolitan Boston Area rerouting signing program has been completed. Up until this time Boston had for years been a maze of overlapping and alternate routes causing considerable confusion. To solve this confusion preferred routes were given primary numbering with other routes relocated or renumbered to eliminate overlaps and indirect routing.

VI Mile Marker Program

The four (4) contracts to install on all numbered routes the mile and tenth-of-mile markers, was completed on June 30, 1972.



TRAFFIC ENGINEERING SECTION

TRAFFIC SIGNAL HIGHWAY LIGHTING AND SOPHISTICATED SYSTEMS UNIT

The authority and responsibility for the activities of this Unit are divided between three managerial groups as follows:

- I. Traffic Signal Group
- II. Highway Lighting Group
- III. Sophisticated Systems Group

The iterative and special functions and activities performed by these groups during fiscal 1972 are as follows:

I. TRAFFIC SIGNAL GROUP

This group has reviewed 122 areawide TOPICS program. Also, 32 of these projects involving traffic signalization have been reviewed at the 75 percent complete level and 12 at the 100 percent level.

From January 18 to January 20, 1972, this group conducted an intensive program for District Maintenance Electricians and Traffic Engineering technicians to provide them with a practical introduction to solid state technology as related to solid state traffic controllers. This course focused on the fundamental concepts of logic symbols, simplified logic circuits, covering terminology, philosophy and operations relating to solid state controllers. Also included were demonstrations of test instruments and trouble shooting techniques applicable to these devices. There were 22 participants and 19 auditors.

This group is also responsible for approval of all traffic signal equipment used by the Department. During the past fiscal year, the group has evaluated and approved solid state traffic controllers from seven (7) manufacturers; induction loop



TRAFFIC ENGINEERING SECTION

## Traffic Signal Highway Lighting &amp; Sophisticated Systems Unit (Cont'd)

detectors from three (3) manufacturers and traffic signal heads from two (2) manufacturers.

II HIGHWAY LIGHTING GROUP

During the past fiscal year, this group has reviewed numerous major highway lighting projects submitted by the Department's Design Engineers. Some of the more important projects in this category are: Interstate Route I-93 from Medford to Reading; I-86 Sturbridge; the Plum Island Bridge in Newbury; the Western Expressway (Route 79) in Fall River; the City Connector (Route 18) in New Bedford; Route 128 from Burlington to Reading; the Merrimac River Bridge (Route 1) from Newburyport to Salisbury; I-391 in Holyoke and I-95 at the Route 128 in Peabody.

This group has also prepared and processed contracts furnishing design engineering services for installation of highway lighting on the following Interstate Routes: I-91 from Longmeadow to Springfield; I-290 from Auburn to Worcester and I-95 from Chelsea to Revere. Recently, the I-95 design contract has been renegotiated to include the design of a concrete median barrier in addition to the highway lighting.

In addition to the above, the following projects have been developed and designed by this group: rest area lighting on I-95, Mansfield; illuminated signs on Route 2, North Adams and Florida; highway lighting on I-91 in Holyoke; Route 2 in Greenfield; the Airport Rotary in Barnstable and pedestrian lighting at the Middlesex Canal in Wilmington.



TRAFFIC ENGINEERING SECTION

Traffic Signal Highway Lighting & Sophisticated Systems Unit (Cont'd)

This group is also responsible for reviewing shop drawings of lighting and electrical equipment, materials and appurtenances submitted by the Department's contractors for installation on projects that are now under construction (i.e. I-695, Boston and I-93, Somerville)

The Highway Lighting Group develops and implements policies and warrants for highway lighting and illuminated signs. The Group also continuously reviews and revises the highway lighting section of the Department's Standard Specifications in order to incorporate the latest in lighting technologies into all Department projects. In order to accomplish this and to stay abreast of the latest technology in the field of lighting and electrical equipment, members of this Group have completed highway lighting courses at the General Electric Lighting Institute in Hendersonville, N. C. in November 1971. They have also attended a Highway Lighting Seminar in Newark, Ohio sponsored by the Holophane Co. in May 1972.

This group also reviews highway lighting research conducted by other agencies and initiates, supervises and evaluates highway lighting research for the Department. We are currently continuing our evaluation of an experimental tower lighting project in Gloucester which has gained the Department national recognition in 1970.





TRAFFIC ENGINEERING SECTION

Traffic Signal Highway Lighting & Sophisticated Systems Unit (Cont'd)

III SOPHISTICATED SYSTEMS GROUP

During the past fiscal year, the Department has decided to limit the initial development of the Metropolitan Boston Surveillance and Control Project to that portion of the Stage 1 installation plan on Route I-93 and I-695, from Route 128 North to City Square Charlestown in the South. The reason for this action was based on the following factors:

1. Enable circulation patterns and improvements to be made to the secondary road system contiguous to the Central Artery and the Southeast Expressway.
2. Final determination be made as to how the roadway configuration around the North Terminal area will be constructed.
3. Final determination on the proposed widening of the Southeast Expressway and the redesign of the Central Artery.
4. Allow time to study the effects to traffic on the Central Artery when I-695, Charlestown is open to traffic.

To forecast the effects to traffic on the Central artery when I-695 Charlestown is open, and to identify concepts for "early action" programs to mitigate the marginal traffic flow conditions that are expected to develop at the I-695, Central Artery intersection, the Department has retained the services of the firm of



TRAFFIC ENGINEERING SECTION

Traffic Signal Highway Lighting & Sophisticated Systems Unit (Cont'd)

Wilbur Smith and Associates Inc. The firm is expected to complete the study and submit their findings and recommendations to the Department during the first week of November of 1972.

An "early action" program along I-93, I-695 and the Central Artery, that has been initiated this year and is presently being designed by the firm of H. W. Lochner, Inc., is a closed circuit television and variable message sign system. This system will begin at a point on I-93 at approximately the Route 28 interchange in Somerville and extend southerly to the North portal of the Dewey Square tunnel in Boston and include that portion of the Central Artery to the vicinity of the Tobin Bridge in Charlestown. This system will function as a "real time" expressway information system for road users within the corridor.

During fiscal 1971, the motorists aid communication system function of this group has emerged from the data acquisition and project formulation stage to field implementation of an Emergency Motorist Aid Call box evaluation system.

This system was installed on a ten mile section of Route I-495 in the Towns of Littleton, Westford and Chelmsford and has been in operation for one year. Within the limits of this system, there are 34 call boxes spaced at approximately one half mile intervals, 3.5 feet off the outside shoulder on the northbound and southbound roadways. These call boxes are the batteryless and wireless matrix F. M. tone coded type. The boxes are placed opposite one another to discourage the road user in distress



TRAFFIC ENGINEERING SECTION

Traffic Signal Highway Lighting & Sophisticated Systems Unit (Cont'd)  
from crossing the traveled way.

Power for operation of each box is generated by the user by opening the door type lever. Once the activating lever is pulled down, four pushbuttons are exposed. Each pushbutton represents a different distress code which is transmitted along with a number code that identifies the location of the call box from which the distress signal originated. Call Box Numbers coincide with nearby mile post numbers.

The four buttons have the designations; Police, Fire, Ambulance and Service respectively.

When one or a combination of the above buttons are pushed a one (1) watt radio signal is transmitted. The antenna for signal transmission is located on top of each post. The antenna to receive the signals from the call boxes is attached to the Commonwealth of Massachusetts, Department of Natural Resources Fire Tower on Robbins Hill in Chelmsford. The signal picked up by this antenna is relayed, via a receiving sending unit, over a New England Telephone Co. leased telephone line to the receiving console located at the Concord State Police Barracks.

The receiving console is equipped with an audible tone to alert the officer manning the console when a call is coming in; a lighted visual display that flashes the number of the activated box and a printout upon which is shown; the time the signal was sent, the box number, the date and the pushbutton category selection (Police, Fire, Ambulance, Service)





TRAFFIC ENGINEERING SECTION

Traffic Signal Highway Lighting and Sophisticated Systems Unit (Cont'd)

The Console is monitored by a member of the Concord Barracks Staff on a twenty-four hour basis.

When the stranded motorist pulls down the door-type lever, selects and pushes the categories he wishes, and then releases the door-lever, a one watt signal is sent to the Robbins Hill Tower and then relayed to the Concord State Police Barracks as described above.

The State Police Officer monitoring the console then dispatches a cruiser to the distressed motorist.

Over a five month period, public response to the system and level of use based on calls per million vehicle miles driven have been analyzed and maintenance costs and operational problems were evaluated. The results of this analysis and evaluation are as follows:

Motorists driving in Massachusetts on Route I-495 during this five (5) month period used the system on an average of 21.7 actual calls per million vehicle miles traveled. This is approximately 3 times the level of use for a similar urban section of I-45 in Houston, Texas where a battery radio call box was used and approximately two (2) times the level of use for a similar rural section on Route I-89 in Michigan where a telephone system installed.





TRAFFIC ENGINEERING SECTION

Traffic Signal Highway Lighting & Sophisticated Systems Unit (cont'd)

During this period of evaluation stamped addressed post cards were given to stranded motorists by the police and other responding agencies.

From 91 cards returned, motorists' response was almost unanimous in praise of this system and for further extension on other state highways. Two (2) cards recommended that a telephone system be used.

The system is presently processing an average of 6.5 calls per day.

Based on the results obtained during this evaluation period the Department has, with the concurrence of the Federal Highway Administration, decided to expand this system on Route I-495. The expanded system will extend in both northerly and southerly directions from the existing system (i.e. Chelmsford, northerly to Salisbury, and from Littleton southerly to several miles south of Route I-90, (Massachusetts Turnpike).

The entire system including the original ten mile project, will be 60 miles in length when the proposed expansion is completed.

Call box receiving antenna are proposed to be located on Mount Wachusett to receive the signals transmitted from the call boxes in the southerly portion of the system; on Robbin's Hill in Chelmsford to receive signals from the central portion of the system and on Holt Hill in Andover to receive the signals from the North portion of the systems. These signals are then relayed



TRAFFIC ENGINEERING SECTION

Traffic Signal Highway Lighting & Sophisticated Systems Unit (Cont'd)

via microwave to a central microwave antenna at the Concord State Police Barracks, and then input to a receiver console located in the Barrack's communication room.

Although we are involved at the present time with the above system we have been keeping abreast of new modes of motorist communications such as in-vehicle communications, so-called audio-signing and various modes of system call response.

In summation, fiscal year 1971 was the beginning of the physical implementation of the first of several planned Emergency Motorist Aid Call Box Systems based upon the appraisal of the many modes of motorist communication systems.



TRAFFIC ENGINEERING SECTIONTRAFFIC ENGINEERING TRAINING

During Fiscal 1972 the Traffic Engineering Section continued its training program by arranging courses for 86 qualified personnel of the Department and 19 selected personnel from local communities and the Federal Highway Administration.

Two graduate engineers from our Traffic Engineering Section completed an eight day course on "Quantitative Methods" at the Traffic Institute of Northwestern University in Evanston, Illinois. This course covered subjects such as probability, estimations, statistical decision making, simple and multiple regression, queuing theory and simulation techniques. The cost for this seminar was 100% reimbursable under the Federal Highway Safety Act.

An eleven day "Technicians Course in Traffic Engineering" was completed by 27 Department employees, plus 9 employees from five cities and towns. Instructors from Polytechnic Institute of Brooklyn conducted this course and it consisted of studies in spot speed, travel time and delay, volumes, origin and destination, parking, capacities of intersections, ramps and weaving. Other subjects covered were traffic signals, signs, pavement markings, channelization, accidents and safety analysis. This course was also 100% funded by Federal monies under the Highway Safety Act.

Other courses given by the Polytechnic Institute of Brooklyn were a one day course on Highway Capacity for 26 administrative personnel of the Department of Public Works and a five day seminar on Highway Capacity for 31 Department of Public Works personnel, plus 10 city and town employees. These courses provided the participants with expertise in the theory and practice in use of data and



## TRAFFIC ENGINEERING SECTION

### TRAFFIC ENGINEERING TRAINING (cont'd)

procedures of the latest AASHO Highway Capacity Manual. Emphasis was placed on practical application of new capacity analysis techniques and concepts in the area of highway planning, geometric design and traffic operations. The Department assumed the cost of these two seminars.

Selected participants from these training seminars are chosen to give lectures and workshop discussions to other personnel of the Department at our Monthly Traffic Engineering Meetings that are regularly held at the District 4 Auditorium in Arlington.

### ANNUAL HIGHWAY SAFETY WORK PROGRAM (AHSWP)

During Fiscal 1972 the Traffic Engineering Section implemented the following projects under grants from the Federal Highway Safety Act:

	<u>Federal Funds</u>
A. Department Projects	
1. Traffic Records	8,713.00
2. Traffic Engineering Training	11,354.00
3. Skid Test Equipment	45,000.00
4. Traffic Engineering Services	<u>11,770.00</u>
(Total)	\$76,837.00
B. Community Projects	
1. Pavement Marking Equipment for 6 cities and towns	103,196.00
2. Warning and Regulatory Sign Equipment	<u>1,300.00</u>
(Total)	\$104,496.00
Grand Total (A & B)	\$181,333.00

The Traffic Engineering Section submitted 14 subelement plans for next year's AHSWP, requesting \$500,000.00 in Federal funds under the Highway Safety Act.





TRAFFIC ENGINEERING SECTION

TOPICS ANNUAL REPORT

The Traffic Operations Program to Increase the Capacity and Safety of urban streets was established by the 1968 Federal-aid Highway Act to encourage municipalities to accelerate their efforts to reduce traffic congestion, facilitate the flow of traffic and reduce accidents. This program provides Federal-aid of 50% of the cost for the study, design and construction of "TOPICS" type improvements. The Department of Public Works provides the remaining 50% of the cost. The municipalities are responsible for land acquisition and the maintenance and operation of the traffic improvements when completed.

The type of improvements eligible under TOPICS are signalization and channelization of intersections, traffic signal control systems, minor widenings, transit turnouts and shelters, pedestrian grade separations, elimination of at-grade road crossings, fringe parking facilities, highway lighting, and other improvements to increase the capacity and safety of traffic.

To initiate TOPICS in a community, several steps are required. 188 communities are eligible in Massachusetts. Eligibility is based on the population density of the community. 150 communities including the Metropolitan District Commission have expressed an interest in the program. The first step is for the community to sign a general TOPICS agreement with the Department in which the community agrees to abide by Massachusetts traffic regulations for TOPICS projects. 141 Communities including the MDC have executed this agreement with



TRAFFIC ENGINEERING SECTION

the Department. The next step is to develop a Type II system for a community which system outlines the streets eligible for TOPICS improvements. The Type II system of a community would include the heavily traveled streets. Boston has been divided into 8 sub areas for easier analysis. 126 Type II systems including 8 in Boston have been developed jointly with our District offices and each community. Next, an areawide TOPICS plan for each community is prepared. This is an engineering study of the community's traffic problems with recommendations for an improvement program. 125 Areawide TOPICS Plan work program and budgets have been submitted. 119 proposed areawide TOPICS plans have been prepared. 535.0 miles of urban streets have been approved as Federal-aid Primary Type II System. 28 Final Areawide TOPICS Plans have been submitted.

While the Areawide plan is underway TOPICS projects in a community may be advanced to design and construction. 71 Eligibility Statements briefly describing the scope and location of a proposed project have been submitted. To analyze the need and features of a project a functional design project report is prepared. 82 Project Reports have been prepared.

Upon review and acceptance of the project report, the design of a project is initiated. 97 design budgets have been submitted. In order to prepare adequate base plans field topographic survey must be obtained for the project location. 144 requests for survey has



TRAFFIC ENGINEERING SECTION

been transmitted. 32.3 miles of base plans have been plotted for 55 projects - 75% preliminary design plans for 49 projects have been submitted. Plans, Estimates, and Special Provisions have been prepared for 22 projects with a construction volume of \$11,800,000. 22 traffic control agreements, 3 railroad force account agreements, 5 utility company force account agreements, and 3 municipal betterment agreements for these projects.

The TOPICS Section has been transferred to the Bureau of Traffic Operations. Support has been provided by the Traffic Engineering, Highway Design, Bridge, and Planning Sections and District offices. The initial TOPICS projects have been designed in-house. This way, the routines and procedures for progressing the designs of TOPICS projects has been clarified for this Federal-Aid Community oriented program. Design engineers have been engaged to aid the Department in advancing projects with the Department staff responsible for final review of TOPICS projects. During the next eighteen months the Department has set up a TOPICS program to advertise 90 projects with a construction volume of 37 million dollars.



STATE AID SECTION

The State Aid Section has the responsibility of processing the payment of State Funds to the Cities and Towns in the Commonwealth for the improvement and maintenance of local roads.

CHAPTER 90

Generally, the State pays one-half the cost of construction and improvement projects with the County and the Municipality each contributing one-fourth. Maintenance assignments are usually divided equally with the State, County and Municipality, each contributing an equal share of one-third. The Chapter 90 Tentative Assignments for 1972 total \$16,767,780.00 with the State's share amounting to \$7,967,440.00.





STATE AID ALLOCATION

## TENTATIVE 1972 CHAPTER 50 ASSIGNMENTS

SUMMARY

COUNTY	STATE	CITY/TOWN	COUNTY	TOTAL
BARNSTABLE	\$261,400	\$138,950	\$138,950	\$ 539,300
BERKSHIRE	494,400	306,725	307,475	1,108,600
BRISTOL	611,800	330,050	330,050	1,271,900
DUKES	44,000	25,800	25,800	95,600
ESSEX	730,500	377,550	361,150	1,469,200
FRANKLIN	366,500	228,500	228,500	823,500
HAMPDEN	629,750	354,650	354,650	1,339,050
HAMPSHIRE	333,600	197,825	197,825	729,250
MIDDLESEX	1,472,250	772,900	780,300	3,025,450
NANTUCKET	28,990	28,990	-	57,980
NORFOLK	633,100	349,650	349,650	1,332,400
PLYMOUTH	530,200	280,600	280,600	1,091,400
SUFFOLK	618,100	618,100	-	1,236,200
WORCESTER	1,212,850	717,550	717,550	2,647,950
	\$7,967,440	\$4,711,410	\$4,072,500	\$16,767,780



STATE AID SECTION

CHAPTER 81

Section 26, Chapter 81 of the General Laws provides for the expenditure of funds for the repair and improvement of public ways other than State Highways, in the 182 Towns eligible for Chapter 81 participation. The work consists of patching, widening, reshaping, as well as, surface treatment with bituminous materials.

The Chapter 81 program for the year 1972 amounts to \$3,600,990.00 with the State's share as \$2,763,255.00.



## CHAPTER 81-SECTIONS 26-29-GENERAL LAWS AS AMENDED

TOWNS UNDER \$5,000,000 VALUATION - LESS THAN 12.00 ROAD MILEAGE RATIO

## VALUATION FROM CHAPTER 559-ACTS OF 1945

COUNTY	TOWNS	MILES	-1.40 \$15.00	-2.00 \$25.00	-2.80 \$40.00	-3.50 \$50.00	-5.50 \$75.00	-7.00 \$100.00	-9.00 \$125.00	-12.00 \$150.00
BARNSTABLE	7	404.63	0	0	0	0	2	4	1	0
BERKSHIRE	23	1003.51	5	2	3	6	5	1	0	1
BRISTOL	8	507.72	0	0	0	0	3	2	1	2
DUKES	3	36.09	0	0	0	0	1	0	2	0
ESSEX	10	416.39	0	0	0	0	0	2	3	4
FRANKLIN	23	1170.40	6	1	3	3	4	1	3	2
HAMPODEN	12	674.99	1	2	3	1	3	2	0	0
HAMPSHIRE	15	767.63	3	3	2	2	3	0	1	1
MIDDLESEX	24	1550.73	0	1	1	1	5	3	8	5
NORFOLK	6	306.15	0	0	0	0	1	1	2	2
PLYMOUTH	8	395.23	0	0	0	0	3	3	1	1
WORCESTER	44	2815.03	1	4	1	3	14	8	8	5
TOTALS	183	10040.60	16	13	14	16	44	27	30	23

TOWNS	ROAD MILEAGE RATIO	MILES	RATE PER MILE	TOWN PAYS	STATE PAYS
16	-1.40	785	15.00	11770.	215961.
13	-2.00	587	25.00	14668.	161430.
14	-2.80	798	40.00	31937.	219611.
16	-3.50	916	50.00	45832.	252140.
44	-5.50	2459	75.00	184421.	676283.
27	-7.00	1652	100.00	165181.	454308.
30	-9.00	1737	125.00	217143.	477738.
23	-12.00	1111	150.00	166783.	305784.
183		17447		837735.	2763255.



STATE AID SECTION

CHAPTER 497, ACTS OF 1971, SECTION 14

In July 1971 the Governor signed into law an Act increasing the excises upon gasoline and special fuels for the purpose of providing additional revenue to cities and towns for highway purposes in the amount of one (1) cent.

Section 14 of this Act amended Chapter 81 of the General Laws by adding Sections 31 and 32 to said Chapter 81 of the General Laws. Section 31 deals with the portion of Highway Fund allocated for reimbursements to cities and towns for costs actually incurred in constructing, maintaining and policing city and town streets and roads to be annually apportioned among the several cities and towns. The amount each calendar year, shall be the "equalized municipal highway grant" multiplied by the number of miles of streets and roads in each city or town.

Approximately \$24,000,000 for calendar year 1972 and \$12,000,000 for calendar year 1971 will be distributed sometime after December 1, 1972.

Section 32 deals with the definitions of the words "constructing", "maintaining" and "policing". These are listed on the next page of this report.





STATE AID SECTION

- CONSTRUCTION : 1. All operations on the travelled way on new location.  
2. All operations on the travelled way where considerable reconstruction is to be undertaken.

Includes resurfacing, shoulders, side road approaches, roadsides, drainage, structures, sidewalks, traffic control and service facilities, intersection construction, unusual or disaster operations and professional services, or any other such purpose the Commissioner of Public Works may specifically authorize.

MAINTENANCE : All operations on the travelled way :

1. scarifying, reshaping, applying dust palliatives and restoring material losses.
2. patching, mudjacking, joint filling, surface treating, etc. and replacement in kind.
3. restoration of erosion controls.
4. reshaping drainage channels and side slopes.
5. tree trimming.
6. replacing topsoil, sod, shrubs, curbing, gutters, riprap, underdrains, culverts.
7. cleaning and repairing culverts.
8. cleaning, repairing and painting of structures.
9. replacement of rail, floors, stringers and beams of structures.
10. replacement of walls and repairing of drawbridges.
11. removal of snow and ice.
12. removal of litter from the roadsides and drainage.
13. operation of drawbridges charged to highway traffic.
14. painting, repairing and replacement in kind of signs, guardrail, signals, lighting standards, etc.
15. maintenance and replacement in kind of rest areas.
16. serving of and furnishing power and light bulbs for highway lighting and traffic control devices.
17. roadside cleaning operations.
18. operation of roadside areas, towing service, information booths, etc.
19. or any other such purpose the Commissioner of Public Works may specifically authorize.

POLICING : All operations on the travelled way by law enforcement officials having to do with the direction or control of traffic; or any other such purpose as the Commissioner of Public Works may specifically authorize.



## RESEARCH AND MATERIALS SECTION

The Research and Materials Section continues to operate in its own building in Wellesley constructed in 1954 when the only function was that of quality control of materials when it was referred to as the State Highway Laboratory. Since that time not only has the testing of materials increased but expansion has taken place with the addition of the Soils and Foundation Unit, the Research Unit and most recently an Environmental Test Unit. The obvious consequence is a serious lack of space both for personnel and for testing and storage facilities. The geographic location is ideal for the operation of the section and an addition to the present building has been recommended.

Personnel from the section have attended many technical committee meetings during the year in order to keep abreast of changes in specifications and methods of construction nation-wide. In some instances members of the staff have presented papers before discussion groups especially at meetings of the American Association of State Highway Officials; American Society for Testing and Materials; Highway Research Board; New Jersey, New York and New England States Testing Engineers, Soils Engineers of Northeast States. They have also attended various seminars sponsored by the Federal Highway Administration.

A more detailed report of the activities of the Research and Materials Section by Units is as follows:



## RESEARCH AND MATERIALS SECTION

### LABORATORY

The assigned function of the Laboratory and its responsibilities are that of (1) determining by means of laboratory and field tests whether or not the materials proposed for use are acceptable and (2) advising the Department as to the most desirable specifications for the control of the quality of materials.

The procedure for materials control is carried out by the four separate testing units of the laboratory, Bituminous, Chemical, Concrete and Soils.

The Bituminous Testing Unit, Concrete Testing Unit and Soils Testing Unit have each been inspected by the AASHTO Materials Reference Laboratory.

The activities of each unit is as follows:

#### BITUMINOUS TESTING UNIT

The bituminous unit is responsible for the quality control testing and research investigations on bituminous materials mixes, pavements and other related bituminous materials utilized by the Department in its construction and maintenance projects.

During the past year, the Department changed its asphalt cement specification from penetration to viscosity grading. This transition was based upon a vast amount of test data compiled by the bituminous unit during the previous several years. Although this change imposes a greater amount of testing per sample it should contribute to a better quality bituminous pavement.



## RESEARCH AND MATERIALS SECTION

In addition to the routine testing and evaluation of new materials, this unit continued to do some testing and analysis in cooperation with the Joint Highway Research Program.

At the present time the bituminous unit is testing and evaluating various types of new bridge membrane waterproofing materials. The total number of routine samples tested by this unit during the past year well exceeded 1200 not including the numerous samples tested in connection with various research projects.

### CHEMICAL TESTING UNIT

The Chemical Unit has been responsible for testing and evaluating materials such as paints, epoxy coatings, adhesives, glass beads, deicing chemicals, herbicides, pesticides, concrete additives, joint sealers, etc. In addition to routine testing this unit performed many evaluative studies on new products such as; concrete epoxies, fast drying traffic paints, concrete adhesives, reflecting sheeting and various new structural coatings for the Product Evaluation Committee. The Chemical Unit is in the process of revising and modifying the paint specifications for inclusion in the materials 1972 Standard Specifications. Numerous water samples have been analyzed in conjunction with the research project on deicing chemicals and some studies in conjunction with the Environmental Test Section have been made on possible impact of new construction on water quality. The total number of samples tested by this unit not including numerous product evaluation samples exceeded 2400.





## RESEARCH AND MATERIALS SECTION

### CONCRETE TESTING UNIT

The Concrete Unit is responsible for the quality control testing of concrete specimens made in the field and for research on new batch designs made in the laboratory. Other related materials tested in this unit include cement, fine and coarse aggregate, brick and block, conduit, reinforcing steel, galvanized products, etc.

The unit has cooperatively tested six (6) Reference Samples from AMRL and six (6) Reference Samples from the Cement and Concrete Reference Laboratory of the Bureau of Standards. Numerous research projects were initiated with particular emphasis placed on bridge deck coatings. A total of 8100 separate samples has been tested by this unit.

### SOILS TESTING UNIT

The quality control testing of soils and soil aggregate materials is the primary responsibility of the Soils Unit. Materials include gravel borrow, ordinary borrow, embankment material, sand, bridge foundation material, loam and peat. In addition to the usual samples from highway projects and Federal Agencies, special sampling of Materials from various other sources were submitted for testing. Some of these materials and their sources included reference materials samples from the AASHTO Materials Reference Laboratory, materials of different soils horizons from the Soil Conservation Service for complete classification, and fine grain soil samples received from the Water Resources Division of the United States Geological Survey for special salt research analysis.



RESEARCH AND MATERIALS SECTION

This year, as in previous years, the unit continued its work in the roadside beautification program by inspecting plantings for conformance with the American Standards - nursery stock specifications. In addition the unit received approximately seventy-five samples of various materials from Districts throughout the state to make a comparison between their results and the results of the Soils Unit. All of these special samples combined with the normal samples totaled approximately one-thousand (1000).



## RESEARCH AND MATERIALS SECTION

### FIELD MATERIALS CONTROL UNIT

During Fiscal 1972 this section was responsible for the continuous review and approval of 63 bituminous concrete plants and 84 cement concrete plants, including out of state suppliers.

The practice of evaluating bituminous concrete job mix formulas by the Marshall Method was continued.

In this time period, 111 Federally aided roadway related construction projects were active. Conformance with Federal Highway Administration requirements necessitated record sampling and inspection to be performed as follows: bituminous concrete construction - 82 progress and 73 final; cement concrete construction - 69 progress and 40 final; steel reinforcement - 56 progress. Review and evaluation of documentation of materials quality control for final certification of completed projects was conducted for 56 separate projects.

Twenty-six stone quarries and forty-nine sand and gravel aggregate producers required semi-annual quality control sampling.

The Guide Schedule for Sampling, Testing and Certification of Materials (Appendix B of the Materials Manual) was revised and amended to keep pace with Federal Highway Administration and Department changes in policy.

Responsibility was assumed for field inspection and evaluation of selected Category II research projects, such as methods of installing chain link fence posts and use of storage (surge) bins for bituminous concrete mixes.



## RESEARCH AND MATERIALS SECTION

During February and March this unit participated in the four seminars on materials, conducted by the Research and Materials Section for District Personnel and also contributed to the similar conferences sponsored by the Construction Section.

The policy of pre-sampling bituminous emulsions at the two main sources of supply prior to bulk deliveries was continued.

Review and recommendations of change for updating the standard specifications for proposed 1972 edition was continued, especially in the areas of bituminous concrete and cement concrete.

Participation on In-House-Research Committee on distressed pavements was continued.

## MANUFACTURED PRODUCTS

### PRESTRESSED BEAMS

Ten bridge structure projects designed for prestressed beams were fabricated, including I-beams, box beams and slab beams. Although the unit lacked personnel, all necessary inspections and tests were performed to insure quality products.

In the near future fabrication will begin on prestressed I-beams for the Prison Point Bridge in Charlestown, involving 80,000 linear feet of beams or 240 individual beams. Possibly this will be the largest prestressed beam bridge project in New England.





## RESEARCH AND MATERIALS SECTION

At the present time there are four (4) fabricating plants in the State.

### CEMENT CONCRETE PIPE

The largest producer of pipe in the State was closed for about four (4) months due to labor litigation. However, most of the pipe was delivered by other pipe plants in the State or in Connecticut. The necessary strength tests were performed on all pipe and recorded as required. In conjunction with pipe testing, precast manholes and catch basins were also tested and inspected.

At the present time there are seven (7) pipe plants in Massachusetts, three (3) in Connecticut and one (1) in New Hampshire shipping into Massachusetts.

### METAL PIPE

All necessary tests and inspections, as required, were performed on metal pipe fabricated in three (3) plants in Massachusetts and one (1) in Vermont.

### MISCELLANEOUS

Inspections and tests are performed on concrete posts and blocks, electric handholes, metal castings and other products pertinent to road building.

### SPECIAL DUTIES

The unit, in many instances, has cooperated as a task force for suggested specification changes as submitted by material committees of AASHO and ASTM.



## RESEARCH AND MATERIALS SECTION

### SOILS AND FOUNDATION UNIT

In the 1972 fiscal year the Soils and Foundation Unit administered nineteen (19) advertised Boring Contracts valued at approximately \$405,000. These projects were reviewed and programs prepared by this Unit. Complementary borings for these contracts were also reviewed. Recommendations were forwarded to the Bridge Department and/or the Consultant Design Engineer involved.

The two (2) Statewide (open-end) boring contracts were also handled by the Soils and Foundation Unit. This work included twenty-four (24) projects in Districts 3, 4, 5, 6, 7 and 8 valued at \$29,798.00 and seventeen (17) projects in Districts 1, 2 and 3 valued at \$20,026.00. The Department boring crew, which worked shorthanded most of the year, completed seventeen (17) projects. Some of this work (five (5) projects) was done for the Water Resources Division of the United States Geological Survey in connection with the research project to determine the effects of highway salting on water supplies. This work is expected to increase in 1973.

Design Bearing Ratios were obtained for twenty-nine (29) projects throughout the State, thirteen of which were for pavement overlay of existing roadways. Sub-grade materials were tested by the California Bearing Ratio method to obtain a Design Bearing Ratio which is used by the Design Engineer to arrive at Pavement Thickness Requirements. Approximately one-hundred (100) miles of roadway were involved in this work.



## RESEARCH AND MATERIALS SECTION

Several Soils reports submitted by consulting engineers were reviewed and comments made to the Design Section. Recommendations were also given by the Soils and Foundation Unit relative to soils testing programs conducted by private agencies.

Approximately fifty (50) construction projects were visited by the Embankment and Soils Field Control Engineer to check on material incorporated in construction embankments. The Nuclear Density Gauge continues to be a valuable piece of equipment in determining density and moisture content. It is again recommended that each District be supplied with its own density gauge.

The Soils and Foundation Laboratory which now utilizes a triaxial testing machine and oedometer in addition to the usual equipment continues to perform its routine testing such as gradations, California Bearing Ratios, Atterberg limits etc. This new equipment now allows us to perform triaxial and consolidation testing which was done on only a few projects in 1972. We hope to expand this program during the coming year. Personnel from the Soils and Foundation Unit act as Technical Representatives, being the liaison contact with the Massachusetts Institute of Technology in the conduct of the following Research projects:

R12-2: Movement and Stability of Cuts and Fills

R12-5: Frost Susceptibility of Massachusetts Soils  
(ending January 1, 1972)

R12-6: Rapid Frost Susceptibility Test for Massachusetts Soils  
(Starting March 1972)

R23-0: Behavior of Varved Clays



RESEARCH AND MATERIALS SECTION

RESEARCH UNIT

The Research Unit was assigned a full-time Research Coordinator in October 1972 with the result that a more active program is now contemplated.

Our Joint Highway Research Project with the Massachusetts Institute of Technology established as a grant in 1950 continued to fill in gaps where expertise was needed. Several small studies have been conducted under this project leading to full scale studies under HPR sponsorship.

The 1972 Highway Research Program for Physical Research HPR I (7); Part II included the following active research.

Number	Title	Researcher	Length of Study	Cost
R5-5	Roadside Development	University of Massachusetts	Five Year	70,000
R-9-0	Small Watersheds	United States Geological Survey	Indefinite	30,000
R-12-2	Movement and Stability of Cuts and Fills	Massachusetts Institute of Technology	Five Year	60,000
R-12-6	Rapid Frost Susceptibility Test	Massachusetts Institute of Technology	Two Year	80,000
R-18-0	Effects of deicing Chemicals Upon Surface & Ground Water	U.S. Geological Survey - Mass. Department of Public Works	Seven Year	50,000 50,000
R-21-0	Negative Skin Friction of Piles	Massachusetts Institute of Technology	Two Year	60,000
R-23-0	Behavior of Varved Clays	Massachusetts Institute of Technology	Two Year	60,000





RESEARCH AND MATERIALS SECTION

Proposed studies included:

Transportation Communication Systems

Hazard Warning Systems

Evaluation of Asphalt Specifications

Corrosive Effects of Deicing Chemicals  
on Bridge Deck Reinforcement

Surface Characteristics of Pavement

Reflectorization of Traffic Signs

A Skid Tester is now on order for use under the study

"Surface Characteristics of Pavement". Due to technical difficulties the Roughometer has not been used the past year on this research.

The Research Unit also coordinated efforts under the contract with United States Geological Survey Water Resources Division with respect to

- (a) Statewide water levels and site investigations
- (b) Investigation of the groundwater hydrology in the Central Boston area
- (c) a study of the effects of highway salt on ground water supplies

and the contract with United States Geological Survey Mineral Branch with respect to geologic mapping, seismic and other geophysical surveys.

Total budgeted cost of research is just under one million dollars a large part of which is reimbursed by the Federal Government. It should be noted that implementation of the results of research under Project R5 - Roadside Development alone have



## RESEARCH AND MATERIALS SECTION

resulted in savings of over two million dollars annually.

Research under R-12-6 is developing a Rapid Frost Test Apparatus of considerable value and research under R-18-0 will satisfy the demands of ecologists for factual information with respect to possible salt migration into wells and streams.

### ENVIRONMENTAL TEST UNIT

The Environmental Test Unit was established within the Research and Materials Section in November of 1971. Staffing for the new unit, including an Environmental Test Engineer was initially accomplished by reassignment from other units of the Research and Materials Section. This unit presently functions under the administration of the Research Engineer.

The purpose of the environmental testing unit is to provide testing services of an environmental nature and to provide technical advice in the environmental field to the Bureaus and Sections of the Department as requested of the Research and Materials Engineer. Testing and evaluation are to be conducted upon areas for air, water and noise quality.

The environmental testing unit also participates in research dealing with environmental problems. As such the unit is providing manpower for the state share of the Research Project R-18 "Effects of Deicing Chemicals Upon Surface and Ground Water".

Examples of some of the other projects during the past year are: providing water and noise data and evaluations thereof on the project for Relocation of Route 140 in Gardner-Westminster; studying and making recommendations as to solutions for a problem of excessive chloride content in well water in the town of Goshen;



## RESEARCH AND MATERIALS SECTION

monitoring a salt storage area in Reading as part of an on going study in how to protect maintenance areas; providing water quality data to the highway design section for the construction of Route 2 in Orange; and monitoring siltation basins on a construction project in Marion.

As usual the problem in establishing this unit to provide the best possible service is lack of funds particularly to purchase suitable equipment.

### STATE GEOLOGIST

The State Geologist has now completed his first year of affiliation with the Research and Materials Section of the Department of Public Works for all highway and related activities. The office also performs studies and reports for other State agencies on request and appears in court as expert for the Attorney General when needed.

Tradition has been followed in the mapping programs both on land and in the air with the work being performed by the United States Geological Survey Office in Boston, Massachusetts under continuing cooperative programs. Until such time as the Commonwealth desires to make a major investment in new staff it is felt that the present arrangement should continue.

Massachusetts is the best mapped State in the country and serves as a model for all others to follow. Every quadrangle in the Commonwealth is mapped on a scale of one inch to two thousand feet (TOPO Sheets). In addition modern geophysical surveys consisting of aeromagnetic, gravimetric and radiometric methods have recently been published.



RESEARCH AND MATERIALS SECTION

Progress has been made toward the goal of publishing a bedrock map of the Commonwealth with forty-nine per cent of the field work completed. Final publication is still some years away, however.

Perhaps the most surprising aspect of operation of this new office has been the demand for services in the fields of ecology, conservation and environmental impact.

An assistant to the Geologist with a Ph.D. degree has been dividing his time between the State Geologists Office and the Department of Public Works Environmental group.

Trends of the coming year should be in the area of distributing information and getting started in publishing pamphlets and brochures concerning subjects of a geological nature for tourists, collectors and especially for use in the public school system.





C



CONSTRUCTION SECTION

The Construction Section of the Department of Public Works during the 1972 fiscal year supervised the inspection of 41.5 miles of highway construction and of related work. Its total value is more than \$70,500,000.

A 7.3 mile project in the Medford through Reading area was the site of the largest contract amounting to more than \$11,000,000.

The Interstate Highway System Construction Program continues to progress with miles of projects up 50% over last year and accounts allotted exceeding four times the expenditures of the previous year.

Our Safety Program was somewhat curtailed this year consisting of thirteen contracts with a total value of slightly over \$1,000,000.

Four landscaping construction projects accounted for less than \$500,000 worth of work.

The Topics Program (Traffic Operations Program to Increase Capacity and Safety on urban streets) continues at an accelerated rate with the award of seventeen contracts with a value of nearly \$10,000,000 which includes the Rutherford Avenue project in Charlestown, the largest Topics Project in the country.

A detailed analysis of the projects undertaken during the 1972 fiscal years follows:



CONSTRUCTION SECTION

PROJECTS AWARDED DURING FISCAL 1972

	INTERSTATE	
	<u>I-91</u>	<u>Bid</u>
Springfield #16384	Safety	\$73,555.40
West Springfield-Holyoke #15351	Landscaping	<u>131,943.05</u>
		205,498.45
	<u>I-93</u>	
Andover-Methuen #16321	1.315 Miles	7,755,000.00
Bedford through Reading #16135	<u>7.300 Miles</u>	<u>11,391,189.40</u>
	8.615 Miles	19,146,189.40
	<u>I-95</u>	
Boston #15926	Demolition	83,720.00
Boston #15987	Safety	142,600.00
Attleboro-No. Attleborough #16096	Safety	215,939.00
August-Lynn-Peabody #16092	Demolition	8,550.00
Dorchester-Revere #16107	1.400 Miles	672,630.00
Revere #16106	1.600 Miles	575,878.00
Boston #16270	Demolition	62,325.00
Peabody #16259	1.440 Miles	7,158,245.00
No. Attleborough-Mansfield-Foxborough #16299	Safety	109,265.00
North Attleborough #16298	Safety	107,570.00
Foxborough #16342	Safety	136,981.75
Foxborough-Sharon #16348	<u>Safety</u>	<u>102,548.40</u>
	4.440 Miles	9,376,252.15
	<u>I-195</u>	
New Bedford-Fairhaven #16258	3.144 Miles	8,358,819.30
	<u>I-290</u>	
Shrewsbury-Boylston-Northborough-Marlborough #16034	Landscaping	295,992.00
	<u>I-291</u>	
Springfield #16328	Landscaping	390,258.00
	<u>I-391</u>	
Chicopee-Holyoke #15968	Demolition	8,032.00



CONSTRUCTION SECTIONI-495

Burlington to Tyngsboro	Safety	\$1,288,405.00
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I-695

Boston #16101	Demolition	5,250.00
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PRIMARY, SECONDARY AND URBANRoute 1A

Revere #15988	0.355 Miles	1,322,764.34
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Route 2

Fitchburg-Leominster #16209	Safety	197,842.00
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Route 6

Dartmouth #16109	0.570 Miles	406,849.70
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Routes 8 & 9

Pittsfield #15975	Topics	601,305.75
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Routes 7 & 20

Lenox #16104	Safety	106,641.10
Lenox Sheffield #16521	Landscaping	<u>17,757.50</u>
		124,398.60

Route 23

Otis #16520	Landscaping	6,045.50
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Route 49

Sturbridge-East Brookfield-Spencer #16281	4.137 Miles	2,690,696.00
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Route 110

Lowell #16122	Topics	521,952.65
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CONSTRUCTION SECTIONRoute 128

Burlington-Woburn-Reading #16114	4.100 Miles	4,896,156.50
Randolph to Westwood #16033	Safety	425,900.00
Randolph to Wellesley #15983	<u>Safety</u>	<u>1,164,494.00</u>
	4.100 Miles	6,486,550.50

Route 140

Taunton #16343	0.793 Miles	479,507.10
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Route 146

Uxbridge-Douglas-Northbridge-Sutton #16119	7.700 Miles	1,745,041.80
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Beacon Street

Brookline #16223	Topics	205,303.00
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Central Street

Framingham #16240	Topics	559,803.30
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Clinton St. on Ramps

Boston #16044	Demolition	91,510.00
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Rutherford Ave. and Austin Street

Boston #16115	Topics	4,846,709.00
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Congress & State Streets

Boston #16113	Topics	221,144.00
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East Street

Methuen #16121	Topics	47,609.75
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Endicott & Sylvan Streets

Lowell-Peabody #16120	Topics	811,669.74
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Bridge & Washington Streets

Weymouth #16138	Topics	94,527.00
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Dwight & Chestnut Streets

Springfield #16112	Topics	147,798.05
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CONSTRUCTION SECTIONUpland Road

Quincy #16102	Topics	118,810.50
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Washington, Hancock & Plain Streets

Braintree #16097	Topics	55,853.00
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Wilbraham, Plumtree & Puritan Roads

Springfield #16455	Topics	173,074.25
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Plum Island Turnpike & Bridge

Newbury #16224	0.565 Miles	2,586,240.50
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6 Locations

Boston #15910	Topics	93,479.00
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Financial District

Boston #15936	Topics	413,233.00
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Main Street

Melrose #16069	Topics	39,762.65
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Milton Academy Area

Milton #16058	Topics	60,098.10
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MISCELLANEOUS NON -FEDERAL AID PROJECTSRoute 1

Newbury #16137	Bridge	699,949.75
Saugus #16315	Landscaping	21,187.49
		<u>721,137.24</u>

Route 2

Acton-Concord #15982	Demolition	3,165.00
Cambridge-Arlington #16180	Safety	11,017.00
Cambridge-Arlington #16347	Safety	17,160.00
Concord-Lincoln #16301	Demolition	<u>10,720.00</u>
		42,062.00

Route 3

Braintree-Quincy #16210	Safety	545,200.00
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CONSTRUCTION SECTIONRoute 3A

Ingham #15967	Safety	26,597.60
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Route 7

heffield #16236	0.484 Miles	142,452.00
Williamstown #16052	<u>1.849 Miles</u>	<u>269,936.00</u>
	2.333 Miles	412,388.00

Route 9

Williamsburg #16177	Bridge	199,621.00
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Route 13

ownsend #16140	0.447 Miles	469,605.00
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Routes 18 & 79

akeville #16080	0.108 Miles	33,240.00
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Route 20

ussell #16331	0.284 Miles	927,200.00
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Route 24

all River #16234	Safety	15,572.30
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Route 28

arnstable #16073	0.284 Miles	53,024.60
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Route I-95 over Route 1

ttleboro #16374	Bridge Repair	110,180.00
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Route 68

ardner #16375	0.435 Miles	31,810.00
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Route 106

Kingston #15890	Bridge over Jones River	204,622.00
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CONSTRUCTION SECTIONRoute 123

rockton #16098	Safety	28,912.40
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Routes 123 & 139

ockland #16176	Safety	30,050.00
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Routes 124 & 137

rewster #16178	Safety	17,955.00
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Route 125

averhill #16093	Bridge	338,279.00
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Route 128

edham #16139	Safety	57,258.00
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Route 140

taunton #16329	County St. Bridge	578,194.00
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Route I-290

Marlborough #16271	Rock Excavation	42,330.00
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Route I-495

Medway-Milford-Hopkinton- Westborough #16273	Landscaping	368,630.25
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J. F. Fitzgerald Expressway

Boston #16088	2.589 Miles	92,910.00
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Lovefield Street

Easthampton #16175	Bridge	232,874.50
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Davol., Brightman, Leonard & George Sts.

Fall River #16046	0.282 Miles	22,556.50
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Union Street

Marshfield-Norwell #16207	North River Bridge	2,979.00
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CONSTRUCTION SECTION

Green River & West Leyden Roads

olrain-Leyden #16227	0.258 Miles	169,549.60
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Rogers Avenue at Route 20

est Springfield #15911	Safety	31,075.75
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Wisdom Way

reenfield #15895	Bridge over	213,269.45
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B & M R.R.

Districts 6 & 7

M-1 #15908	Mile Markers	109,271.50
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Districts 4 & 5

M-2 #15913	Mile Markers	76,284.60
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Districts 1 & 2

M-3 #15914	Mile Markers	96,824.50
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District 3

M-4 #15909	Mile Markers	114,462.50
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SUMMARY

	<u>Miles</u>	<u>Amount</u>
INTERSTATE	16.199	\$39,074,696.30
PRIMARY, SECONDARY & URBAN	18.220	25,149,578.78
NON FEDERAL AID	<u>7.020</u>	<u>6,415,926.29</u>
TOTALS	41.439	\$70,640,201.37



## CONTRACT ENGINEER SECTION

The Contract Engineer's Section processes the bids for Federal Aid Projects requiring B.P.R. Concurrence, State Highway Construction Projects, Chapter 90 Projects, Maintenance Projects, Waterways Projects, Boring Projects, projects for the construction, reconstruction, alteration, remodeling, repair, or demolition of buildings under the provisions of General Laws, Chapter 149, and Right of Way Projects involving the sale of houses, and the leasing of State-owned property, from bid opening to award of contract and maintains all the necessary records therefore. The prequalification and post-qualification of contractors is administered by this Section and the issuance of Proposal Forms and plans to prospective bidders requires the approval of this Section. Force account agreements with public utilities, cities and towns are reviewed for approval.

### MAJOR ACTIVITIES

1. At bid openings all proposals are publicly opened and read subject to verification for arithmetical correctness, examination for informalities and compliance with applicable statutes.

2. After a bid opening all proposals are immediately checked for compliance with requirements. Proposals that are unacceptable due to incompleteness, irregularities, collusion, qualifying clauses, etc., are duly noted and if the deviation is a matter of substance that is prejudicial to the rights of other bidders a recommendation for rejection of such bid is made, on the other hand, a deviation may be merely a matter of form or some immaterial variation from the exact requirements that can be waived by the



## CONTRACT ENGINEER SECTION

### MAJOR ACTIVITIES (CONT'D)

Commission under the right reserved. In the latter instance, if such bid is the lowest bid submitted, a recommendation will be made that the informality be waived and the project awarded to the low bidder as being in the best interest of the Department. After all bids have been checked and verified a "Summary of Bids" is prepared, printed and collated for distribution to interested Sections, Divisions, District of the Department, contractors who bid on the particular project, and local trade magazines and publications. Copies are retained for the Sections Records.

3. Letters recommending award or rejections are prepared and typed by this Section for the Chief Engineer's signature for presentation to the Board. Such letters are routed to our Fiscal Section for an assignment of funds. For work involving Federal Funds, letters are also prepared and typed for the Chief Engineer's signature, requesting Bureau of Public Roads concurrence in the award or rejection of contracts as required by Federal Regulations.

4. Prequalification Statements submitted by contractors as required by General Laws, Chapter '29, Section 8B are analyzed, computed, and a Rating determined for submission to our Prequalification Committee. Performance Records of Contractors who have previously performed work for this Department are maintained in this Section, and are designed to provide facts and documented data on every completed project and the contractor's performance thereon. Such records provide a source of information for



## CONTRACT ENGINEER SECTION

### MAJOR ACTIVITIES (CONT'D)

recommendations made by the Contract Engineer to the Prequalification Committee for the determination of Prequalification Ratings or limitations thereon warranted by the facts.

5. For projects for which prequalification is not required, the low bidder and/or the lowest responsible bidder must submit a post-qualification statement, duly signed and sworn to, outlining his experience, equipment and financial resources on forms supplied by this Department. These post-qualifications statements are computed and analyzed exclusively by this Section and on the basis of the computation and analysis a recommendation for award or rejection is made to the Board.

6. Since the enactment of the Prequalification Statutes all requests for Proposals and Plans for bidding purposes have to be cleared and approved by this Section. This policy was adopted so as to prevent the issuance of Proposals and Plans to contractors who are ineligible to bid because of failure to meet the requirements of the Prequalification Statute and Regulations.

7. Records of all activities of this Section are maintained for purposes of documentation and a source of information.

(a) A complete alphabetical file of all contractors who have performed work for this Department is kept current at all times. This file shows the location of each project which the contractor has performed, the advertising date, bid opening date, bid amount, date of award, and starting and completion dates.





CONTRACT ENGINEER SECTION

MAJOR ACTIVITIES (CONT'D)

(b) A card index file for each project awarded, showing date of advertising, opening of bids, date of award, office estimate, bid price, contractor's name and address, contractor's qualification, start of construction, date of completion, extensions of time, if any, and contractor's performance record.

(c) A card file of projects awarded in each city or town, showing name of contractor, type of project, and the starting and completion date of all contracts performed within the city or town.

(d) Prequalified contractors, their prequalification rating and date of expiration.

(e) A list of "Active Bidding Contractors" who submit bids for any project for this Department each calendar year is prepared and maintained.



CONTRACT ENGINEER SECTION

MAJOR ACTIVITIES (CONT'D)

Projects Awarded for Fiscal Year Ending June 30, 1972

<u>Number</u>	<u>Category</u>	<u>Amount</u>
54	Federal Aid	\$ 63,953,488.48
40	State Highway Construction	6,598,939.34
35	Chapter 90	4,744,797.60
355	Maintenance	15,808,803.00
43	Waterways	15,347,478.25
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527	Total	\$106,453,506.67

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During the fiscal year July 1, 1971 to June 30, 1972 a total of 300 contractors were prequalified.



### FINAL REVIEW SECTION

The work of the FINAL REVIEW SECTION consists of checking each of the quantities for the various items which represent the amount of work done by a contractor in constructing with the Department of Public Works. This checking consists of reviewing all supporting data for each of the various items as recorded in manifold books, pile books, calculation books, time books and other records of the Resident Engineer; the plotting and sub-grading of final roadway, rock and peat cross-sections so that an accurate final pay quantity may be determined; and the computation of borrow pit quantities based on preliminary and final surveys of the borrow areas. After determining each of the final quantities of the various projects, a cost sheet is prepared so that the construction engineer and others may know the cost comparison with bid and allotment amounts, and a careful analysis is made between the Resident Engineer's quantities and the Final's quantities as well as between the Preliminary and Final quantities so that explanations of all differences which exceed 10% may be determined and prepared. Greater use is being made of the computer for deriving accurate pay quantities for Roadway, Rock, Peat and Loam stripping items. A recent innovation, the "Quality Control Ledger", that documents and expedites projects work has proven its worth to the satisfaction of all concerned. A manual of instruction for the preparation of final estimates and reports for highway and bridge projects was prepared. The manual has gone to press.



FINAL REVIEW SECTION

"Pre-Final" review teams have been formed which consist of 2 or 3 men from the Final Review Section who are requested to visit various projects nearing completion and finalize items directly at the construction site. This operation reduces controversies and expedites the processing of the project because the availability of the Resident Engineer affords the opportunity to solve any differences of opinion immediately and effectively. This procedure has been accepted favorably by the Districts. The following is a "Breakdown" of the value of contracts processed by the Final Review Section during the period from July 1971 through June 1972.....





FINAL REVIEW SECTION

BREAKDOWN VALUE OF CONTRACTS PROCESSED BY THE FINAL  
REVIEW SECTION

VALUE OF STATE HIGHWAY CONSTRUCTION CONTRACTS:

HAVING FEDERAL AID PARTICIPATION = \$ 87,642,311.70

VALUE OF STATE HIGHWAY CONSTRUCTION CONTRACTS:

NON-FEDERAL AID = 6,555,429.26

VALUE OF STATE AID (Chapter 90) Contracts: = 17,686,561.68

VALUE OF MAINTENANCE CONTRACTS: = 9,542,547.04

VALUE OF MISCELLANEOUS CONTRACTS: = 3,769,618.23

(Includes Consultant Services, Boring  
Contracts, Boston - (P.W.B. Contracts),  
Traffic, etc.)

Total..... \$ 125,196,467.91

NOTE:

Not included in the above totals are thirty-  
two (32) Federal Estimates (FINAL FEDERAL AID  
VOUCHERS) which were submitted during the period  
of July 1971 through June 72.



## PROCEDURES & RECORDS SECTION

THIS SECTION IS RESPONSIBLE FOR THE CONTINUOUS, COMPREHENSIVE AND SYSTEMATIC REVIEW OF THE RECORDS, POLICIES AND PROCEDURES RELATING TO THE TECHNICAL OPERATIONS PERFORMED BY ORGANIZATIONS REPORTING TO THE CHIEF ENGINEER.

### I. MAJOR ACTIVITIES

A. Project Reviews - Engineering Teams from this section conduct on-site "In-Depth" inspections of active highway and bridge construction projects to assure compliance with Contract Specifications, Department Standard Operating Procedures and other controls. During this Fiscal Year, approximately sixty (60) such reviews have been conducted. Review reports are submitted directly to the Chief Engineer with copies distributed to the Construction Division, Research & Materials Division, respective District and the Division Office of the Federal Highway Administration.

The effectiveness of reviews is reflected in the following quote from the FHWA Summary Report for 1971 Construction Season:

"May I call your attention to the recognition in this report to the substantial help from field reviews by your Records and Procedures Branch in maintaining continued excellence of construction records in the field. These periodic reviews, we believe, discover oversights in procedure or records at about the time the event takes place, which is a great advantage in the timing of corrective action if any is necessary. We fully endorse these field review arrangements by your Records and Procedures and commend the personnel involved for their fine work and reporting."



I. MAJOR ACTIVITIES (cont)

B. Equal Employment Opportunity - The Procedures & Records Engineer was designated Department EEO Coordinator and implementation of procedures, review of compliance and required reporting relative to EEO was delegated to the Procedures and Records Section.

Personnel of the Section have been responsible for and provided direction relative to nondiscrimination and affirmative action as required by the Federal Highway Administration through Interim Orders 7-2(1); 7-2(2); and 7-2(3) the so-called "Home Town" plans and the Governor's Executive Order #74. This has involved us, in conjunction with other Sections, in implementing regulations in Contract Specifications. Personnel provide consultation and interpretation of EEO regulations at one or more Preconstruction Conferences for every Federally Aided project.

Compliance Reviews are conducted both independently and in the company of personnel of the Division and Regional Offices of the Federal Highway Administration at construction project sites and at the "Home Office" of all contractors and major subcontractors working Federal Aid Projects.

As with engineering reviews, reports of EEO Compliance evaluation are submitted directly to the Chief Engineer and distributed to appropriate Divisions and Districts. In addition, the section compiles all required statistical reports. A tremendous workload is assumed in relation to approval and monitoring of "On-the-Job" trainees.

The Section has fulfilled its obligation in the area of EEO by prominently participating in the many conferences and seminars of other governmental agencies as well as initiating Department Programs.





I. MAJOR ACTIVITIES (cont)

C. Standard Operating Procedures - Procedures & Records has continued to review all proposed new or revised Standard Operating Procedures concerning engineering or technical operations. Where necessary, investigations were conducted and SOPs edited to clarify procedures or enunciate policy.

II. SPECIAL ASSIGNMENTS

In several areas, this Section has been involved on a continuous basis for special assignments:

A. Final Vouchers - Personnel have investigated problems and questions in order to expedite Federal Reimbursement. Citations submitted to us by Fiscal Management have been investigated and reclaims prepared when justified.

B. Construction Safety - The Department's increased responsibility because of OSHA (Occupational Safety & Health Act) regulations has involved the Section in preparing an SOP and directives for project personnel, conferences and close liaison with the Division of Industrial Safety, Department of Labor & Industries and review of the proposed Safety Manual prepared by the American Association of State Highway Officials.

C. Department Census Report - Once again, the Section solicited, collated and summarized the Annual Census of all Department personnel by grade, sex and comparative totals of minority groups.

D. Summer Youth Opportunity - Again, for 1972, the Section prepared correspondence soliciting Contractors and Consultants to provide employment for disadvantaged youths in the Highway Industry.





II. SPECIAL ASSIGNMENTS (cont)

E. Construction Seminars - Once again, the Section aided in scheduling and participating in Construction Seminars for Resident Engineers and field personnel .

\* \* \* \* \*

Per request of the Chief Engineer and/or Commissioner, the Section has during the past year, fulfilled several Special Reviews and submitted reports and recommendations:

A. State Aid In-Depth Review - At the request of the Governor's Advisory Committee on the Construction Industry, the most comprehensive Study of the Department's State Aid Highway Program to date was conducted by personnel of the P&R Section with excellent cooperation, contributions and support from all Districts and the State Aid Office at 100 Nashua Street.

The resulting report and recommendations were transmitted to the Committee after consultatation with Department Engineering Administrators and Commissioner Campbell.

B. Cooperative Snow Plowing Review - At the request of the Chief Engineer, a review was conducted and a report prepared "listing all possible options" as relates to the Department's Cooperative Snow Plowing Program.

The resulting recommendations were implemented by the Board of Commissioners.

C. Personnel Reviews - The Procedures & Records Engineer and his staff have been involved in several reviews and contributed to Special Committees relative to Department engineering positions.



II. SPECIAL ASSIGNMENTS (cont)

E. Title VI Review of Department - The Section coordinated and implemented under the leadership of the Commissioner and Chief Engineer, with the support and cooperation of all Divisions, a special review conducted by a task force from the Federal Highway Administration of the Department's compliance with Title VI of the Civil Rights Act of 1964.

III. LIAISON WITH OUTSIDE AGENCIES

A. Federal Highway Administration - In addition to formal contact with the FHWA, personnel of this section have participated in Seminars and Workshops conducted at the Regional and National level.

Auditors and Trainees from the FHWA have reviewed the performance of the Section and have accompanied teams on project reviews with beneficial results.

B. AASHO & AHONAS - These organizations of State Highway Officials have received information and critiques developed at the direction of the Chief Engineer and Commissioner for presentation before technical working committees.

C. Other States - Acting as liaison for the Department, this Section has prepared replies to general and specific inquiries from sister states.

D. Contractor Organizations - A productive relationship of mutual benefit has been maintained with the NERBA, MATCO and AGC organizations. Of particular note, are contributions relative to EEO and construction safety.

E. Unions - The cordial relationship of this Section with the Highway Industry Trade Unions has aided in reducing tensions in the introduction and involvement of minorities in training and employment.



III. LIAISON WITH OUTSIDE AGENCIES (cont)

F. Minority Organizations - The Section has continued to foster a working liaison with minority organizations throughout the Commonwealth, not only in the area of Contract projects, but by promoting minority employment with the Department and State Service.

\* \* \* \* \*

In summary, the Section has satisfactorily assumed and performed assigned responsibilities relative to records, policies and procedures and, further, contributed immeasurably in other sensitive areas when called upon. This can be attributed to the calibre of personnel and to the direction, endorsement and support of the Chief Engineer.

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## MAINTENANCE SECTION

### CONFERENCES AND MEETINGS

Following is the Annual Report of the Maintenance Section for work performed during Fiscal Year 1972.

This Report reviews accomplishments, recommends legislation and contains information relative to each operating Maintenance Unit.

During Fiscal Year 1972 conferences were held under the Chairmanship of James F. Kelley, Maintenance Engineer. Two conferences were held on Snow and Ice Control, one conference on Structures Maintenance. All District Highway Engineers, District Maintenance Engineers, and their respective Unit Assistants were present and/or represented at these conferences. The purpose of said conferences was to discuss various Maintenance policies, review problems, and re-affirm uniformity of operations.

The Structures Maintenance Engineer conducted a Bridge Inspector's Training Program. The program consisted of lectures and field inspections to recognize, record, evaluate and report bridge conditions. All Districts were represented by their Bridge Maintenance Personnel. Also invited were members of the Metropolitan District Commission, Massachusetts Turnpike Authority, Federal Highway Administration and Engineers from the State of Rhode Island.

The Maintenance Engineer is Chairman of the Highway Research Board Committee "Roadside Maintenance". As such, he presided over a formal Session on Roadside Maintenance and a Committee Meeting at the Annual Meeting in January of 1972 in Washington, D. C. He is also a member of two other committees, "Maintenance Equipment" and "Maintenance and Operations Personnel".



MAINTENANCE SECTION

REGULATORY PERMITS

July 1, 1971-----July 1, 1972

During the year the following permits were issued by the Boston Office:

	<u>No. of Permits</u>
Heavy Equipment, House Trailers and Buildings	24,228
Utilities	450
Driveways	<u>140</u>
<u>Total</u>	24,818

During Fiscal Year 1972, 3,150 permits have been issued via telegram.

During Fiscal Year 1972, 10,539 permits have been issued via transceiver.

Chapter 48 of the Resolves of 1971, directed the Department of Public Works to study the feasibility of charging for overdimensional and overweight loads being transported on commercial vehicles.

Consequently a Permit Committee was established consisting of the following members:

James F. Kelley	Chairman & Maintenance Engineer
Leo Reed	Department Counsel
Henry Holmes	Asst. to Chief Engineer
Thomas Quinlan	Acting Bridge Engineer
Joseph McCarthy	Permit Engineer

The Committee concluded that the establishment of a fee schedule was in fact feasible with proper space and staffing, and recommended passage of enabling legislation.



MAINTENANCE SECTION  
EQUIPMENT

- 3 -

The Following Equipment was purchased in the 1972 Fiscal Year

Replacement Equipment

<u>No.</u>	<u>Items</u>
5	Air Hammers
2	Centrifugal Pumps
3	Concrete Mixers
5	Chipping Hammers
10	Chain Saws
1	Crane Truck
16	Dump Trucks
29	Utility Trucks
1	Catch Basin Cleaner
1	Fork Lift
3	Grease Guns
3	Front End Loaders
25	Paving Breakers
3	Paving Breakers
50	Pickup Trucks
1	Rotary Snow Truck
25	Stake & Rack Trucks
2	Sewer Cleaners
23	Sweepers
1	Shop Sweeper
1	Spray Booth
1	Steam Cleaner
1	Vacuum Applicator
5	Wood Chippers
<u>NEW EQUIPMENT</u>	
4	Compressors
10	Dump Trucks
6	Factory Charts
1	Ignition Analyser
1	Garage Jack
2	Front End Loaders
2	Hydraulic Sprayers
15	Pickup Trucks
2	Paint Machines
2	Sweepers
	Small Tools & Equipment





MAINTENANCE SECTION

## ANNUAL REPORT - 1972 FISCAL YEAR

TWO-WAY RADIO COMMUNICATIONS

The Department's Two-Way Radio Communication Network licensed by the Federal Communications Commission and operated and maintained by Maintenance personnel in accordance with the provisions of Part 89 of the Commission's Rules, regulating conduct of the Highway Maintenance Radio Service, continued to provide an efficient means of communications during the routine and emergency activities of the Department during the year.

At the present time the network consists of the following units:

MAINTENANCE SECTION

- A. 1 Monitor Control Station
- B. 10 District Base Stations
- C. 5 Microwave Links with Related Terminals
- D. 8 Auxiliary Base Stations
- E. 6 Auxiliary Civil Defense Stations
- F. 2 Emergency Portable Stations
- G. 398 Mobile Stations in Cars and Trucks
- H. 30 Citizen's Band Portables and related "Walkie Talkies"
- I. 12 Monitor Receivers for Storm Emergency Message Reception

Upon recommendation of communications personnel of the Department and under the supervision of the Maintenance Engineer the program of preventive maintenance applicable to fixed radio installations was continued and a program of replacement of base and mobile units was implemented whereby compact transistorized equipment is replacing tubed dual unit mobiles and solid state equipment is replacing tubed base station equipment as far as budgetary limitations will permit. There is every indication that savings in material and labor will offset initial costs.

A final 'phase out' date of the "original purchase" equipment had been estimated to occur in Fiscal 1975 but a more realistic appraisal now makes Fiscal 1982 the more probable date.

In Fiscal 1972, 12 new mobile units were procured without trade of existing equipment in order to provide communications for new positions necessary to maintain the 9500 miles of state and interstate highway.

Specifications were prepared by Maintenance Communications Unit personnel and bids were solicited for the replacement of Station KCC 685 with its, related microwave terminals on Mount Wilcox in Monterey, Massachusetts with a Control at the Lenox Office thereby assuring District One of complete radio coverage in the hilly Berkshire County terrain. It had been determined in the course of an inventory by Department Communications Personnel that natural attrition by the passage of time and the rigorous winter weather had placed the original station economically beyond the point of useful maintenance and repair.





In furtherance of the Department's Highway Safety Program this unit provided communications for and assisted in arranging for operation of twenty-two Holiday Highway Motorist's Aid Patrols on limited access highways in Districts 4, 5, 6, 7 and 8 during peak traffic periods on the long Holiday week-ends of Memorial Day, Independence Day and Labor Day.

In accordance with instructions from Commissioner Campbell arrangements were made with the Director of Public Information and the General Services Section for a photographer to be present during the period of patrol activity. The photographers were equipped with a radio equipped vehicle in order to expedite the taking of newsworthy pictures and their activities were coordinated with local news media.

The purpose of the operation was to relieve Police for enforcement duties by performance of routine and emergency highway maintenance functions.

These operations were successful and appear to have been well received by the traveling public as indicated by favorable comments in Metropolitan and Suburban news media.

The fog alerting procedure, established as an innovation by the Maintenance Engineer and the Snow and Ice Control Staff, whereby the State Police are informed via teletype by the communications unit of possible fog problems on State Highways based on best available forecast data and upon receipt of confirmation from the State Police, of the development of a foggy, hazardous driving condition, the Maintenance Engineer or certain designated alternates alerts State Forces via the Communications Unit to take appropriate warning action in the foggy areas, thereby safeguarding the traveling public, continued in operation throughout the year.

During the Fiscal year members of the Communications Unit for the first time were authorized to attend the "Snow Schools" held in each District and to instruct base and mobile operators in proper message techniques. With the shortage of available frequencies and the steady increase in mobile use of this message medium, strict adherence to good message handling techniques appears to be the only solution for avoiding harmful interference to Department users during stormy periods.

In compliance with the requirements of the Federal Communications Commission, schedules and tabulation sheets were prepared and vehicular movements were coordinated in the conduct of the annual frequency measurements on mobile radio units. Arrangements were also made for frequency measurements on Department Stations through a Contract with the Cambridge Thermionic Laboratory in Cambridge. This assured certified primary frequency measurements of all base stations acceptable to the F.C.C. and provided positive assurance against "drifts" into other assigned areas of operation. Specifications were also prepared and test equipment procured enabling the Radio Repair Men to supplement the primary measurements with their own and to keep the need for the primary measurements at a minimum.

The aforesaid radio maintenance personnel continued to perform preventive maintenance and emergency repairs on Department radio equipment with priority being given to base station operations. "Outs" and operating costs were kept at a reasonable



## MAINTENANCE SECTION

minimum.

In accordance with Legislative Mandate and Department policy the two way radio network of this Department was coordinated with the State and Federal Civil Defense Agencies. Consultation was also held with the Department's Liaison Engineer at M. C. D. A. and Communication Dispatcher's instructed in reception of information from severe storm spotters whose field observations are transmitted via the Nashua Street Radio Room to M. C. D. A. for further transmission to Logan Airport via "NAWAS".

The Department's Auxiliary Civil Defense Network consists of Base Stations licensed to operate on Department Frequencies and located as follows:

- |                  |                             |
|------------------|-----------------------------|
| 1. State Control | Framingham                  |
| 2. Area          | 1 - Tewksbury               |
| 3. Area          | 2 - Bridgewater             |
| 4. Area          | 2 - (Sector 20) West Dennis |
| 5. Area          | 3 - Westborough             |
| 6. Area          | 4 - Belchertown             |

Mobile operations are conducted by use of the State-Wide Network authorized in the Department's license for the Call Sign KA - 8171 and there is a mobile station for this Department in the Civil Defense Mobile Station van.

The emergency communications net, which was established to provide a liaison apparatus with the United States Bureau of Public Roads and related Federal Agencies in the Boston area for the relay of Federal Defense Conditions messages continued to be maintained on a standby basis.

Assistance was provided by the Maintenance Communications Unit in the preparation of radio maintenance and repair contracts in order to insure uninterrupted communications to the Districts by assuring the services of a reputable contractor in each District in accordance with the provisions of Chapter 29, Section 8A of the Massachusetts General Laws.

Representation was provided by the Communications Unit at Meetings called by the Department of Natural Resources for the purpose of consolidating certain microwave facilities of this and other State Agencies on Mount Wachusett in Princeton, Massachusetts in one highly secure and modern transmitter housing. Because of the many adaptations to the various Agencies requests, progress in this matter is slow but an estimated date of 1975 for this desirable change over appears reasonable at this time. It has been stipulated by this Department through its representatives that no expense other than the minimal cost of a physical equipment relocation will be incurred in this desirable rearrangement which will have an assured auxiliary power source and maximum security against vandalism.

In accordance with a request from the American Association of State Highway Officials, the Deputy Chief Engineer for Highway Maintenance agreed to serve as Member for Massachusetts on the AASHO Subcommittee on Communications, whose



MAINTENANCE SECTION

function is to coordinate applications for frequency allocations in the Highway Maintenance Radio Service and local Government Radio Service with the Federal Communications Commission and other Public Safety Radio Service Committees and users.

While the function of the indicated Subcommittee is advisory and does not bind the Commission or the applicant, the Commission states in its Rules and Regulations that, in its absence, proof of notification and concurrence to all co-channel and adjacent frequency users within a radius of 75 miles or a costly engineering survey must be provided with the application. In the course of the fiscal year 176 applicants availed themselves of this Public Service either on their own behalf or through an authorized coordinator in the Public Safety Radio Service.





MAPS AND STATISTICS UNIT

This unit maintains statistical data on all State Highways, such as length, width, thickness of pavement shoulders and foundations, year built and whether built under construction, reconstruction or resurfacing projects.

Maintenance expenditures, cost comparison and analyses are prepared by this unit as required by the Department.

The maintenance costs are reported by District and Activities. A cost per lane mile of each item is also shown.

Bridge and Highway Coding numbers are set up by this unit.

All Highway data has been set up in the electric computer and breakdown of the data can be obtained as required for Department use.

All Districts are supplied with a tabulation of the State Highway by Repair Sections and broken down into Highway Routes, Towns, Types, width, lane and linear miles, etc.

The Snow and Ice Control Schedule and maps are prepared in this office.





## MAINTENANCE SECTION

### HIGHWAY MAINTENANCE

For the purpose of maintaining the surfaces of our State Highway System, including drainage facilities, shoulders and guard rails, each of the eight Districts of the State is divided, geographically, into working sections containing, as nearly as possible, ninety (90) lane miles of surface. Due consideration is given to other pertinent factors, such as isolated sections of State Highway, physical barriers etc., and necessary temporary adjustments made during the procedure of establishing the working sections.

Each maintenance section is staffed in accordance with a previously approved staffing formula within the limits of positions and personnel made available to the Department by others.

Maintenance consists of routine physical maintenance work and betterment work. Physical maintenance consists of maintaining the highway and its existing facilities or restoring it to its originally constructed condition and includes surface treatments with liquid bitumens and cover aggregate, or as has been the case almost entirely for the last fifteen years, treatment by the application of bituminous concrete overlays of less than 3,4" in depth.

Betterments include improvements and additions to the originally constructed highway, such as drainage and guard rails and includes overlays of 3,4" depth and over, which represent capital outlays.

Physical maintenance and betterment projects are carried out both by using Department forces and by contract. As our lane mileage increases each year, because of our lack of sufficient personnel and in the interest of economy and allowable time, most of the major items of maintenance, either physical or betterments, are being performed under advertised contracts.

The substance of this report will deal primarily with a summary of major items of physical maintenance carried out by contract, including resurfacing.

### PHYSICAL MAINTENANCE

Routine maintenance operations were carried out by Department Maintenance Forces, and included such operations as minor shoulder repairs and certain shoulder or surface treatment with liquid bitumen and sand or stone cover. A regular program is prepared to carry out surface treatment throughout the eight Districts of the State by the application of Class I Bituminous Concrete Type S.T.



## MAINTENANCE SECTION

This year twenty-two (22) contracts were awarded for surface treatment covering a total of approximately thirty-seven (37) linear miles.

The Department has no maintenance depot or personnel located on the Island of Nantucket, therefore, maintenance of the only State Highway (Siasconset Road) on the Island has been carried out by the Town of Nantucket under a contract with the Department. The sum of \$10,000.00 was allotted for this work.

### BETTERMENTS - FORCE ACCOUNT

Ten (10) Force Account Betterments, located in Districts 2, 3, 4, 7 and 10 were approved to be carried out by District Maintenance Forces during the year, at a total estimated cost of \$12,360.00. Work performed included new drainage and guard rail installation.

Two (2) Betterment Projects, located in District 7, were carried out by contract during the year at a total cost of \$83,000.00. Project work involved new drainage installations and \$32,500.00 of this amount was from the Accelerated Highway Program.

### RESURFACING

Although only \$4,000,000.00 was appropriated and allotted to the regular resurfacing account for Fiscal 1972, an additional \$4,000,000.00 was made available from the Accelerated Highway Program and used on projects located west of the Connecticut River (Area I).

Accordingly a total of forty-one (41) contracts were awarded during the year for the resurfacing of approximately one hundred and forty (140) miles of highways with Class I Bituminous Concrete Type I-1, varying in widths from 24 feet to over 60 feet and varying in depth from 1-1/4" to 3".

Considering the fact that the two thousand seven hundred and thirty (2730) miles of highway surface has an average life span of fourteen (14) years, it is evident that, even with additional Accelerated Highway Funds, we are only maintaining seventy-five (75) percent of our pavements.

### MISCELLANEOUS

Preparation of the report on "Quotation Prices per ton for Bituminous Concrete Patching Mix Furnished and Loaded at Plant" was completed following the "Critical Path Method Chart" used for the past couple of years and with additional assistance by the Computer Section. In order to avoid a possible lapse in having material available, especially "hot mix", the annual March advertising date was changed to coincide with the Fiscal Year.



## MAINTENANCE SECTION

Maintenance appropriations are substantially inadequate to properly carry out needed maintenance and betterment operations if we are to keep pace with the constantly increasing mileage of our State Highway System owing largely to the construction of the Interstate System.

Our Highway Design Standards now include many new safety features as specified by the AASHO Traffic Safety Committee. These new standards are usually not incorporated into an existing roadway until it is being reconstructed. In the meantime the majority of our highways continue to lack these betterment type features at the expense of the highway user.

The ever increasing traffic volumes, both rural and urban, plus the anti-skid type winter tires, tend to diminish the effective life of a pavement, thereby increasing the frequency of the need for resurfacing.

Delay in obtaining adequate funds for surface treatments at the time they are initially proposed frequently results in deterioration of the surface where resurfacing becomes necessary at a much greater expense. Likewise, assignment of funds near the end of a Fiscal Year, as has been done in previous years, does not allow sufficient time for the preparation of contracts and completion of the work before the end of the Fiscal Year, at which time use of non-continuing accounts expire.

Our present Fiscal Year Calendar, although compatible with fiscal operations State-wide, is not in reality conducive to the most economical or efficient method of Highway Maintenance. Due to the seasonal limitation it would seem more beneficial to utilize the "construction season" for construction and the winter season for planning, instead of the present exactly opposite procedure.

Therefore, it is recommended that:

1. Appropriations for proper maintenance of our Highway System should be in balance with the normal requirements for same.
2. Such steps as necessary be taken from time to time to encourage the Legislature to make provisions for the preceding recommendation by making them constantly aware of the need.





ROADSIDE MAINTENANCE

Activities carried on under the Maintenance Section Roadside Development Unit during Fiscal 1972 consisted of Contract Tree Planting, Tree Trimming, Mist Blower Spraying, Mowing of Grass, Removal of Trees and Stumps and Travel Trash Collection, Normal Force Account Roadside Maintenance activities, such as Brush Control for Safe Sight Distance, Vista Clearing, Selective Clearing and Trimming, Rest Area and Truck Turnout Improvement and Maintenance, Drainage Ditch Clearance, Emergency Tree Removal and Trimming along with Litter Pickup, were carried on in all Districts.

The Cooperative Research Program, sponsored jointly, by the Massachusetts Department of Public Works, Bureau of Public Roads and the University of Massachusetts, Department of Plant and Soil Sciences of the College of Agriculture has produced and is continuing to produce demonstrative results. Various experimental slope plantings of Evergreen Seedlings, Crownvetch and Sweetfern have been made in all Districts, using plant material grown at the University and collected sods and rhizomes of Sweetfern to solve our problems of soil erosion and expensive mowing requirements. With the use of growth chambers, the personnel of this program is working on methods to artificially break the dormancy of seeds, thereby reducing the cost of plant materials to be used on our slopes.

The Maintenance Division has implemented this program by planting Crownvetch, Sweetfern (container grown), Seedlings, Crownvetch seeds (18000 lbs.) and applying the mulches for the slopes. Wood chips were found to be very satisfactory to control erosion on the slopes. Aged bark was used to restore the forest floor in Rest Areas.

The Highway Landscape Supervisor, in the capacity of Technical Advisor to the Research Program, is able to direct efforts in the field of combating erosion through planting material in the various environments of the State. He is also representative of the Commissioner on the State Pesticide Board and in this position has access to first hand knowledge of desirable and undesirable chemicals used in destruction of harmful insects, weed control and soil sterilization along with instructions in their safe usage.

Budgetary assignments were insufficient to provide a complete program in Plant Fertilization, a desirable program in Roadside Maintenance. Unfortunately, funds were not adequate to accomplish this work. Healthy roadside growth is a deterrent to soil erosion and additional funds should be made available to accomplish roadside fertilization in the coming year.

Tree Trimming was performed in eight (8) District in Fiscal 1972. For Fiscal Year 1973 no funds have been made available. This leaves \$350,000.00 worth of normal State-wide Tree Trimming requirements unfulfilled.

No assignment of funds to the Tree Trimming Program will jeopardize the health of millions of Trees along the roadsides. Overtime payment for removal of dangerous branches felled by storm would nearly pay the cost of a comprehensive and complete annual Tree Trimming Program.





Other roadside responsibilities of the Maintenance Section are listed as follows:

TREE PLANTING

10,082 hardwood, shade, evergreen and flowering trees and shrubs, along with 4,183 seedlings and lining out stock, 3,575 sweetfern (containers) and 5,000 crownvetch (peat pots) were planted in eight (8) Districts under eight (8) separate contracts totalling \$250,000.

The seedlings and lining out stock, sweetfern and crownvetch planting is part of our relentless struggle to control erosion and reduce mowing areas.

DISTRICT	TREES SHRUBS	SEEDLINGS LINING OUT	SWEETFERN CONTAINERS	CROWNVETCH PEAT POTS
1	698	4000	--	2000
2	703	4875	500	--
3	1761	3250	1000	--
4	1053	1400	--	1000
5	2998	14098	--	1000
6	882	6560	1600	1000
7	1041	--	475	--
8	946	--	--	--
	10082	34183	3575	5000

BLAST BLOWER SPRAY FOR SUPPRESSION OF DUTCH ELM DISEASE

This work was accomplished on a State-wide basis under seven (7) individual contracts at a cost of \$57,186.50. Spraying for suppression of Dutch Elm Disease is a mandate of the laws.

HYDRAULIC SOIL STERILANT AND SPRAYING

This work was accomplished on a State-wide basis under eight (8) individual contracts at a cost of \$80,000.00 for Fiscal 1972.

Funds should be provided for this very necessary program that has such a beneficial effect on the health and safety of the public we serve, especially spraying under the State's 600 miles of guard rails to eliminate grass and weeds to expose the guard rails for safety. Spraying for the eradication of Poison Ivy is included under this contract and it is maintenance work required under law.



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This method eliminates the need to cut by hand the weeds and grasses that are undesirable.

MOWING OF GRASS ALONG STATE HIGHWAYS

In an attempt to have tighter control over mowing operations, the work was broken down into ninety-seven (97) contracts, one for each Repair Section with the Repair Foreman responsible for mowing in his Section. There seems to be a definite improvement in the quality of the work under this system. The ever increasing area of roadsides requiring mowing forebodes higher costs which can only be reduced or minimized by a positive program of mulching and planting for the dual purpose of erosion control and cost reduction.

The work is being accomplished under ninety-seven (97) contracts along 2,742 miles of highway at a cost of \$767,280.00.

<u>DISTRICT</u>	<u>NO. OF CONTRACTS</u>	<u>MILES</u>	<u>COST</u>
1	2	276	
2	12	382	
3	17	462	
4	17	381	
5	12	268	
6	19	432	
7	15	484	
8	3	57	
TOTAL	97	2742	\$767,280.00

REMOVAL OF TREES AND STUMPS

Dead, diseased and dangerous trees are removed in the interest of highway safety and to promote health in existing desirable roadside growth. This work was accomplished on a State-wide basis for removal of 3,368 trees under fifteen (15) contracts at a cost of \$237,871.54. Removal of trees that are affected with Dutch Elm Disease is mandatory under the law. Trees that may present hazardous conditions should be removed to protect the public and avoid liability for the Department.



<u>DISTRICT</u>	<u>NO. OF CONTRACTS</u>	<u>TREES REMOVED</u>	<u>COST</u>
1	2	737	\$59,385.00
2	2	521	42,628.00
3	3	488	34,816.00
4	3	727	38,222.00
5	2	308	23,211.54
6	1	293	19,440.00
7	1	251	17,372.00
8	<u>1</u>	<u>43</u>	<u>2,797.00</u>
TOTALS 15		3368	\$237,871.54

TRAVEL TRASH COLLECTION

Thirteen contracts were awarded for the collection and disposal of travel trash along 460 miles of State Highway. Ten contracts call for the emptying of a total of 1,150 Department-owned travel trash barrels and three contracts required the contractor to furnish 54 containers, serviced by packer type disposal trucks. The cost is much less than would be the cost of doing this work with Department personnel and equipment.

Travel Trash Collection is in the interest of public health and part of our program to keep 250 Roadside Rest Areas clean.

PREVENTIVE ROADSIDE MAINTENANCE

With each mile of new highway being accepted by the Department, the acreage of roadsides increases by about twenty-seven acres, most of which, on slopes is seeded to grass. The master plan for developing preventive maintenance into over 50,000 acres of land that abuts the 2,800 miles of State Highway, which was originated several years ago, is still being pursued through the mulching and planting of many areas, State-wide, with over 30 species of hardy seedlings, shrubs, ground cover, natural growth sods and trees, contingent upon the availability of funds. When the ecology is right, natural growth is induced to fill in the planted area to present naturalistic roadsides.

Our planting is to effect economy in Highway Maintenance. Grassy areas requiring several mowings annually are being transformed into naturalistic roadsides with built-in erosion control.





Attractive roadsides will encourage greater numbers of tourists who uplift our State's economy through the expenditure of over a billion dollars annually.

SELECTIVE CLEARING AND BRUSH REMOVAL FOR SIGHT DISTANCE.

No funds were provided to accomplish this work which is directed to highway safety by opening sight distance and exposing background views to the motorist. It is recommended that this work be pursued in order to attain a higher level of safety and to improve the appearance of our Highways.

Special attention should be given to the following:

1. Exposing guard rail which may be screened by grass, brush or trees.
2. Reducing the number and extent of passing restrictions.
3. Opening up scenic vistas.
4. Raising the branch level of trees to give height clearance.
5. Improving the visibility of all traffic signs and traffic lights.
6. Improving visibility in the vicinity of turnouts, rest areas, driveways and intersections.
7. Improving the general appearance of the roadside.

DITCH CLEARANCE

Obstructions to flow in drainage ditches contribute to soil erosion along our highways and inefficient flow of drainage system discharge. This year, District forces will spray vegetation existing in ditches. Current obstructions in ditches should be cleared away under contract as our 1,600 miles of ditches will be too much to ask our already undermanned personnel to attempt along with their other necessary duties.

CONSTRUCTION OF ROADSIDE REST AREAS

Modernization of existing rest areas and the critical need of construction of new facilities is considered essential in promotion of travel. Many of our existing rest areas are currently being used beyond a practical capacity.

Certain locations, State-wide, were selected for Roadside Rest Area Construction under President Johnson's Beautification program. It is apparent that no funds will be forthcoming under this program and other arrangements must be made to provide these critically needed areas as soon as possible.





MAINTENANCE SECTION

Recent field observations indicate that we do not have a sufficient number of Rest Areas on some routes. The existing facilities are being put to near capacity use by drivers of both passenger cars and trucks. Weekend observations noted double the usage and a definite lack of sufficient facilities.

Land values are rising rapidly, particularly near new expressways. Further delay in obtaining land and designing areas will make for high cost in future construction. Action should be taken now!



## MAINTENANCE SECTION

### SNOW AND ICE CONTROL

Snow removal on State Highways carried out under authority of Section 19, Chapter 81, of the General Laws as amended.

Snow and Ice Control activities include: Responsibility for proper performance of plowing snow, spreading sand and chemicals, erection of snow fences, the clearing of waterways, winter patrolling of the highways, removal of snow from bridges, loading and hauling of snow from certain structures and the clearing of signs and signals. The Snow and Ice Control Section is also responsible for the post season contracts to clean highways and catch basins, the acquisition and improvement of Maintenance Areas and the system of fog warning on highways.

During the 1972 Fiscal Year the Department plowed and treated with sand and chemicals 9,530 lane miles of State Highway.

Snow and Ice Control on Town roads is carried out under the authority of Section 11, Chapter 83, of the General Laws. During the year, the Department cooperated in plowing 475 linear miles of Town highways. Under the Act, the highways selected were plowed in cooperation with the Town with 50% of the cost being borne by local agencies. However, under date of May 23, 1972, the Board of Commissioners voted to discontinue this program effective the 1974 Fiscal Year, due to high administrative costs and the limited funds being appropriated therefor.

The program for providing industrially pre-mixed sodium and calcium chlorides has continued to improve. In Fiscal Year 1972, the Chemical Corporation prosecuted a contract for 36,000 tons in the ratio of five parts sodium to one part calcium (by weight). The cost was \$21.925 per ton. The material blending and its use have been decidedly enhanced through added experience.

The construction of chemical storage sheds continued with an appropriation of another \$300,000.00 from the Legislature. A proposal was advertised for contract construction of fifteen (15) 40 feet wide by 84 feet long, with an intended capacity over 1,000 tons each.

Another appropriation providing, \$300,000.00 for the "Acquisition and Improvement of Maintenance Sites" afforded the opportunity of many needed improvements and additions to our operational bases. Seven (7) new sites were acquired in Lee, Sheffield, Buckland, Westfield, Avon, Dartmouth and Freetown. All sites were upgraded with full sanitation facilities, water and sewerage and most areas requiring chain link fence and gates for protection were satisfied.



MAINTENANCE SECTION

The concept of two-year contracts was continued this past year for both highway cleaning and catch basin cleaning. The advantage of this coverage is elimination of one year's complete contract processing, preparation, advertising, award -- since each of the aforementioned was to do the same work, in the same areas, during the same season in each of the two succeeding Fiscal Years. This not only serves the Department's best interest but becomes more attractive to contractors in affording them a year's scheduling in advance and warrant for further investment in their equipment. The concept worked well, with a minimum of problems.

The defense against dense fog's sudden development on high speed highways leading to multiple accidents has been advanced by improved warning systems. The Department's meteorological consultant, Weather Services, Inc., of Bedford, still has written into their contract provision for such forecasting in addition to their usual forecasting services and agreement has been reached with the State Police for observation pursuant to warnings of potential fog development. Department forces are then alerted for placement of warning devices as conditions deteriorate. It is an initial approach toward serious but somewhat indefinite set of weather phenomena which will depend mainly on improving forecasting techniques.

The Storm Emergency Center's Communication with the several State Agencies and surrounding Cities and Towns during the past winter was comparatively quiet. During the prior three (3) winters, this media, established to facilitate access to and exodus from the core city, was used effectively on many occasions. Last winter can best be characterized as very severe, an almost continuous sequence of smaller storms (33 average State-wide), with a high frequency of freezing and thawing cycles, plaguing the highway crews and motorists. None were sufficient to incur extensive tie-ups but were of the size and low-temperature variety that cause extensive chemical outlay and must be classified as expensive.

The Snow and Ice Control Engineer is a member of the Highway Research Board Committee on "Snow and Ice".

A Snow and Ice Control School was conducted in each District.





STRUCTURES MAINTENANCE

BRIDGES

As of July 1, 1972, the Department had maintenance responsibility for a total of 2,050 bridges, having a total work load area of approximately 2,406,400 square yards. This compares to 2,010 bridges and a work load area of 2,399,900 square yards maintained a year ago.

The Department shows maintenance responsibility on 130 bridges over various railroads which are included in the total.

The Department had Operations and Maintenance responsibility for nineteen (19) Drawbridges located over navigable waters.

LOCATION OF DRAWBRIDGES

OPENINGS DURING FISCAL 1972

Amesbury-Deer Island Bridge over Merrimack River	140
Beverly-Salem, Route 1A over Danvers River	1111
Beverly-Salem, Kernwood Avenue over Danvers River	1154
Beverly Hall Whitaker Bridge over Bass River	14
Gloucester, at Blynman Canal Route 127 over Annisquam River	7855
Haverhill-Groveland, Route 97 over Merrimack River	12
Haverhill-West Newbury Rocks Bridge over Merrimack River	13
Newbury, Plum Island Turnpike over Plum Island River	169
Salisbury-Newburyport, Route 1 over Merrimack River	1591
Braintree, Weymouth Landing Route 3 over Monatiquot River	1
Fall River-Somerset, Brightman Street over Taunton River	916
New Bedford-Fairhaven, Route 6 over Acustnet River	347
Quincy-Weymouth, Route 3A across Weymouth Fore River	513
Westport Point, Route 88 over Westport-River	90
Scituate-Marshfield, Route 3A over North River	11
Tisbury-Oak Bluffs, Beach Road over Lagoon Pond on Martha's Vineyard Island	406





LOCATION OF DRAWBRIDGESOPENINGS DURING FISCAL 1972

Boston-Milton, Granite Avenue Route 3 over Neponset River	853
Cambridge, Commercial Avenue over Lechmere Canal	70
Lynn-Saugus, Western Avenue over Saugus River	2139
TOTAL OF ALL OPENINGS	<u>17,905</u>

CONTRACT MAINTENANCE PROJECTS

The following 37 bridges and 1 (one) radio tower were painted under 22 contracts:

<u>CITY OR TOWN</u>	<u>LOCATION</u>	<u>COST</u>
Florida-Savoy	Rte. 2/Cold River	\$4,900.00
Huntington	Rte. 112/Westfield River	\$15,670.00
Sheffield	Rte. 7/Housatonic River	\$5,675.00
Charlemont and Buckland	Rte. 2/Deerfield River Rte. 112/Rte. 2	\$19,865.00
Northampton	Rte. 10/R.R. and Rte. 10/Clarke Ave.	\$6,533.00
Orange	Rte. 2/Rte. 122 W. River ST/Rte.2	\$8,220.00
Erving- Montague	Rte. 63/Millers River	\$8,720.00
Westfield	Rte. 20/Westfield River	\$22,800.00
Barre	Rte. 32/Prince River Rte. 32/Ware River	\$1,980.00
Northboro	Rte. 9/Rte. 30	\$2,450.00
Brimfield	Rte. 20/Elbow Brook	\$950.00
Lowell	Hunt Falls Circle/Rte. 110	\$5,475.00
Lowell	Lowell By Pass/Beaver Bk.	\$5,980.00
Lowell- Chelmsford	Rte. 3/Rte. 110	\$3,237.00
Bedford and Billerica	Rte. 3/Shawsheen River Rangeway Road/Rte. 3	\$9,040.00
Wakefield	Rte. 128/North Ave. Rte. 128/Parker Road	\$9,535.00
Wakefield	Rte. 128/Lowell St. Rte. 128/Main St.	\$10,152.00
Lexington	Radio Tower at District Office	\$1,800.00
Lawrence	Union St/Merrimack River	\$51,500.00
Boston	S.E. Expressway/ Neponset Circle	\$87,800.00
Boston	Four Bridges/ S.E. Expressway	\$59,390.00
Fall River- Somerset	I-195/Taunton River	\$602,000.00
		<u>\$943,672.00</u>



CONTRACT MAINTENANCE PROJECTS

<u>CITY OR TOWN</u>	<u>LOCATION</u>	<u>WORK</u>	<u>COST</u>
HARWICH	Rte. 6/Slough Rd.	Structural Steel Repairs	\$10,400.00
OAK BLUFFS-TISBURY	Beach Road over Lagoon Pond	Operation and Maintenance of Drawbridge	\$3,225.00
BOSTON and VICINITY	State Highways	Electrical Maintenance Services	\$21,902.00
ARLINGTON	District #4 Administration Office	Roof Repairs	\$25,998.00
DANVERS	District #5 Administration Building	Roof Repairs	\$22,000.00
BOSTON	Rte. 3-S.E. Expressway Neponset Viaduct and Viaduct over Mass. Ave. Ramps	Bridge Deck Repairs and Surface with Bit. Conc.	\$21,650.00
			<u>\$105,175.00</u>

CONTRACT BETTERMENT PROJECTS

<u>CITY OR TOWN</u>	<u>LOCATION</u>	<u>WORK</u>	<u>COST</u>
AUBURN	Rte. 20/Penn Central R.R.	R.R. Back Walls, Approach Slabs, Deck Work and Membrane Waterproof	\$94,693.00
LUDLOW-SPRINGFIELD	Rte. 21/Chicopee River	Waterproof Resurface and Related Work	\$53,910.00
AMESBURY	Main St.(Deer Island Drawbridge) Merrimack River	Motorization of Movable Bridge	\$68,264.00
NEWTON	Rte. 9/Centre St.	R.R. Bridge Rails and Add Some Bituminous Walks	\$16,969.00
GREENFIELD	Rte. 2A/Green River	Waterproof, Resurface and Related Work	\$44,300.00
ORLEANS	District # 7	Constructing new Foreman's Garage	\$259,000.00
PITTSFIELD	District # 1	Constructing new Foreman's Garage	\$246,900.00
MILTON	District # 8	Constructing new Foreman's Garage	\$257,000.00
ARLINGTON	District #4 Administration Office	Renovations and Alterations of Heating System	\$38,882.00



CONTRACT BETTERMENT PROJECTS

<u>CITY OR TOWN</u>	<u>LOCATION</u>	<u>WORK</u>	<u>COST</u>
ATTLEBORO	Rte. 1 over R.R.	R.R. Bituminous Concrete, Install Bleeders and Waterproof	\$9,910.00
HOLYOKE	Lyman St. 2nd Level Canal	R.R. Bituminous Concrete, Erect New Type Bridge Railing and Apply Waterproofing	<u>\$42,750.00</u>
			1,132,578.00





## MAINTENANCE SECTION

### BRIDGE INVENTORY PROGRAM

In conjunction with the Bridge Inspection Program, all bridges on the Federal Aid System must be inventoried by July of 1973. Our Structures Maintenance Section is coordinating this inventory. It includes 80 items for each bridge concerning the Identification, Classification, Structural Data, Condition, Appraisal and Proposed Improvements. This information must be coded and then put on the Computer. Many problems had to be solved as this is an entirely new program. However, when it is completed any information concerning our bridges will be readily available on the Computer. It will aid our Department in establishing a program for Bridge Replacement and Maintenance.

Our program is 25% complete and present indications are that the Department can substantially meet the deadline set by the Federal Highway Administration.

This program will insure the safety of our bridges for the traveling public.

### BRIDGE INSPECTOR'S TRAINING PROGRAM

Under the Federal-Aid Highway Act of 1968, the United States Congress required the Secretary of Transportation to develop a program to train bridge inspectors.

A Bridge Inspector's Training Program conducted by the Structures Maintenance Section of the Department of Public Works began on January 10, 1972 and ended on February 10, 1972. The course was conducted according to a program that was developed by the Federal Highway Administration. This same course is being used nationally by the other States.

Lecturers were selected from experienced Department Engineers. Guest lecturers who were experts in their particular topics also assisted in the program.

All Topics concerning bridges were thoroughly discussed. The classroom instruction was supplemented by actual field inspection. The inspectors were trained to recognize, record, evaluate and report bridge conditions.

A total of 43 Engineers from the Department of Public Works successfully completed the course. The Department of Public Works cooperated with other agencies in the training of Bridge Inspectors. Six Engineers from the Metropolitan District Commission and two Engineers from the Massachusetts Turnpike Authority successfully completed the course. Four Engineers from the Rhode Island Department of Transportation also successfully completed the course.

The purpose of the program was to train Bridge Inspectors to meet the deadline set by the Federal Highway Administration to have all bridges on the Federal Aid System inspected by July of 1973.





The Department of Public Works is vigorously pursuing a bridge inspection program. Inspections are underway in all eight districts. There are 1,940 State-owned bridges on the Federal Aid System. A total of 1,665 have been inspected. Present indications are that the Department can substantially meet the deadline.

Massachusetts is ahead of most States in this program concerning public safety.

#### BUILDING MAINTENANCE

The past Fiscal Year closed with the completion of four badly needed Foremen's Garages.

Two were completed in District 8 in time to be occupied by State forces for the 1971-1972 winter season. This proved to be extremely beneficial to the motoring public since the snow and ice vehicles, formerly stored out in the open, were completely under cover resulting in little or no delays in dispatching equipment to troubled areas.

The Revere building (a metal structure) was completed at a cost of \$164,000.00.

The Milton building (a concrete structure) was completed at a cost of \$260,000.00.

The following buildings were occupied by State forces in the month of June 1972:

In District #1, in the City of Pittsfield, a concrete structure was completed at a cost of \$258,000.00.

In District #7, in the Town of Orleans, a concrete structure was completed at a cost of \$269,000.

It is hoped that this tremendous step forward in the construction of Foremen's Garages will continue.

Steps are now being taken to negotiate a contract for a concrete garage in District #1 in the Town of West Springfield. The estimated cost will be \$290,000.00. Along with this, it is anticipated to complete the balance of the District #1 Williamstown Garage by adding the garage bays deleted previously due to unavailable funds. The estimated cost of this project will be \$75,000.00.

#### MISCELLANEOUS BUILDING MAINTENANCE

##### District #1 - Lenox Administration Building.

Roof Sealing project performed by Maintenance Forces using R-11 shield type roof preservative as manufactured by Ranco, Ind. Products Corporation.

##### District #4 - Arlington Administration Building.

Work was completed on a contract in the amount of \$26,000. for roof repairs.



Work was completed on a contract in the amount of \$39,000.00 for the complete renovation of the heating system.

District #5 - Danvers Administration Building.

Repairs to the roof were advertised and a contract awarded to Belleau Metal Works, Inc. of Salem in the amount of \$19,600.00. Work should be completed by August 1972.

District #8 - South Boston Administration Building.

A contract was completed by E. H. Marchant Company of Boston in the amount of \$5,000.00 for a complete new heating system in the District's stockroom.

In addition to the above contracts, numerous minor projects were carried out in all Districts on a Force Account basis in order to properly maintain our various building complexes throughout the State.

CIVIL DEFENSE

The organization of the Department of Public Works for Civil Defense and Emergency Planning Operations is based on the State-wide plan for organization of all State agencies for any/all types of emergencies (either natural or enemy caused) and is designed to operate in conjunction with and subject to the general planning of the Massachusetts Civil Defense Agency.

In compliance with a series of Executive and Administrative Orders issued by his Excellency the Governor, the Department has:

- (A) Designated a person to act as its Civil Defense Officer who is responsible to the Commissioner for Civil Defense and Emergency Planning and Operations within the Department and the coordination of all field operations for the Department with the Massachusetts Civil Defense Agency, other State agencies and certain Federal Agencies - (Administrative Order #13).
- (B) Provided for the protection of its personnel, equipment, buildings and supplies - (Administrative Order #22).
- (C) Discharged its assigned responsibility in the State Civil Defense Agency by assigning one of its employees on a full time basis at the C.D. Headquarters, Framingham, to act as the Engineering Service Officer - (Executive Order #25).

The aforementioned brief synopsis of the legal ramifications committing the Department to the Civil Defense mission should help to clarify the following major Civil Defense programs involving Departmental participation during Fiscal 1972.

Provided full time assignment to the State Civil Defense Agency as required (Section 3 Executive Order #25).





Completed Emergency Highway Traffic Regulation Training in all Districts. The University of Massachusetts Civil Defense Training Staff conducted simulated operating conditions exercises for Department Engineers, Massachusetts State Police and organized Highway Users.

Coordinated workshops on Damage Assessment for Department participation in a State-wide 1972 Civil Defense Exercise.

Developed a Department plan for shelter, fire and evacuation of the Administration Building, 100 Nashua Street, Boston.

Attended various meetings for the purpose of preparing Emergency S.O.P.'s for the Department.

Arranged for the exchange of all radiological instruments assigned to the Department.

Distributed inventory forms for all engineering equipment at State and local level.

Assisted in implementing Public Law 99 as it pertains to Federal participation in improving safety conditions of dams and streams.

Coordinated engineering activities for damage assessment to communities declared major disaster areas as a result of late winter storms of 1972.

Coordinated Department participation in reporting unusual weather conditions to the United States Department of Commerce.

#### CHAPTER 634 - ACCEPTANCE OF RAILROAD BRIDGES

Chapter 634 of the Acts of 1971 directs the Department of Public Works to accept the ownership of all bridges over Railroads throughout the State. There are 610 bridges now owned by either the Railroad, the Cities or the Towns that may be transferred to the Department of Public Works.

The Railroad is in bankruptcy and has been doing very little maintenance on its bridges. The Cities and Towns are not financially able to replace the bridges over Railroads that they own. The Maintenance Section of the Department of Public Works will have the responsibility of maintaining these bridges.

A committee of Department personnel was formed to establish guidelines for an orderly transfer of ownership. The Structures Maintenance Engineer represents the Maintenance Section of this committee and is its secretary. The committee has met twice a month and has resolved many problems pertaining to Chapter 634. The actual transfers of ownership should be implemented during 1972.

Many of these bridges are in deplorable condition and will require extensive maintenance. It will be necessary to replace some. If the necessary funds are made available these bridges can be improved. It will be an aid to the Cities and Towns and it will improve the safety of the traveling public.



EXPERIMENTAL WORK

As in previous years, the Structures Maintenance Unit continued with experimental work with the cooperation of the Wellesley Research and Materials Section and District personnel.

As a result of a reduction of monies available for experimental work and the extreme work load placed on District Maintenance forces, there were only a few projects undertaken in the Fiscal Year.

NEW PROJECTS

## District #2

A 1/2" epoxy mortar overlay was placed on the Route 2A bridge deck which crosses the Green River in the Town of Greenfield. The material used was EPI-TOP 100 as manufactured by Celanese Coatings Company. The material was installed in the same manner as the installation made on Route 24, Avon, in June 1971. The Contractor was the Koch Construction Company of Greenfield. The cost was \$14,000.00. The material was placed in September 1971. As of July 1972, the material shows little sign of abrasive wear but there are hairline cracks appearing. These do not appear to be reflective cracks since the concrete deck was in good condition.

## District #4

An EPI-TOP 100 broadcast system was applied to the Main Street-Engell Road bridge over Route 9 in Framingham in June of 1972. Work was performed by District Forces under the supervision of representatives of the Celanese Coatings Company.

A prime coat of EPI-TOP 100 was applied at the rate of 20 SF per gallon with rollers. One lane was sandblasted, the remaining lanes were just air cleaned. The concrete deck surface was preheated to a temperature of 180°F. A broadcast of fine silica aggregate was applied. A second coat of EPI-TOP 100 was applied with rollers at the same rate as the first. The coat contained an air releasing agent and also asbestos fibres in order to provide a denser layer for the top course. Sand blasting sand was applied by air and silica sand was hand broadcast.

This project will be inspected periodically to check wearing qualities.

PRIOR PROJECTSBrockton - Route 24 Over Oak Street - Southbound

Material: Sika-Colma Dur - Appears to be in good condition  
Sika-Surface Kote - Complete failure

Avon - Route 24 Over South Street - Northbound

Material: Celanese EPI-TOP 100 - Mortar - Appears to be in good condition.





Prockton - Route 24 over Oak Street - Northbound.

Material: Con/Chem-Cono Crete - Appears to be in good condition.

Avon - Route 24 over South Street - Southbound.

Material: Meta Kote 250 - Complete failure.

PROPOSED PROJECTS

Birds - District #6 plans to continue the never ending battle against the damage done to our structures by birds. It is proposed that the work be done by contract, utilizing the product "Rid A Bird", which has proved to be very effective in the past.

Deck Patching -

District #1 proposes to use Guard Kote 250 for concrete deck patching in areas where traffic is very light.

Other projects contemplated in the coming Fiscal Year will be the use of new types of Membrane Waterproofing Systems and expansion joints of the sealing type similar to the transflex joint.



## MAINTENANCE SECTION

### TRAFFIC MAINTENANCE

#### GENERAL

In fiscal 1972 the Traffic Maintenance Unit started to feel the first effects of the new Federal Guidelines in regards to Traffic Control Devices. These Guidelines will be followed by the governing agencies who administer over the installation and maintenance of these devices.

The new Federal Guidelines are outlined in the 1971 National Manual on Uniform Traffic Control Devices. The impact of the changes as set forth in this Manual will be felt by anyone who travels the nations highways but perhaps a greater impact will be felt by the personnel responsible for implementing the change from the old to the new Traffic Control Device Standards.

A prime reason for the new standards is for increased Highway Safety and when society improves itself in this manner there is usually a price tag attached. Such is the case with the changeover in Traffic Control Devices. One example is the conversion from the non-yielding sign support on a 20 S.F. sign to a breakaway sign support for the same sign. The old post cost approximately \$67.00 to install while the new breakaway support costs \$156.00 to install. There are many instances of similar increased cost with the improved Traffic Control Devices.

It can be seen that budgetary allotments simply based on previous years activities is not valid criteria for a successful maintenance program. Those controlling the funding must consider how design and safety improvements add to the cost of a successful maintenance program.

This year has seen several legislative bills being passed authorizing the Department to contract out the maintenance of street lights in various areas. This authorization is unnecessary since the Department already has that right. It would be much more beneficial if the legislature passed a bill setting up a separate account for this activity and funding it adequately. Ever increasing amounts of safety lighting is being incorporated into the highway system and little is done to increase the personnel servicing these installations or little is done to give monetary relief to this vital area.

Another concern of Traffic Maintenance is the legislative assignment of additional traffic controls such as traffic signals and speed signs owned by others to be maintained by the Department. Again with such an assignment there is no accompanying allocation of personnel and/or monies to accomplish the work. This type of legislative action can only lead to the downgrading of overall Traffic Maintenance activities unless the resources are made available to accomplish the work.



MAINTENANCE SECTION

Continuous improvement is being made in certain areas of Traffic Maintenance particularly in regards to contract innovations, new equipment purchases and improved products. More detail on these subjects follows.

One factor that allows the Traffic Maintenance Organization to accomplish the imposed workload is the overall dedication of the State personnel involved in this activity.

The fact that the maintenance of Traffic Control Devices directly affects the traveling public seems to instill a certain amount of personal pride in the traffic maintenance worker that belies the derogatory characterizations some times made against "State Employees".

The personnel of the Traffic Maintenance unit participated in the following courses and seminars during fiscal 1972: -

Traffic Maintenance Engineer

- 1 - Basis Supervisory Course
- 2 - Chairman HRB Committee A3E05 Maintenance Operations  
Chaired Annual Committee Meeting in Washington, D.C.  
(January 1972)
- 3 - Gave 2 lectures to Bridge Inspectors -  
concerning Overhead Sign Inspection.

Traffic Line Maintenance Engineer

- 1 - Traffic Engineering Course - by  
Brooklyn Polytech at Arlington

Traffic Sign Maintenance Engineer

- 1 - Highway Capacity Course - by  
Brooklyn Polytech at Arlington

Traffic Signal Maintenance Engineer

- 1 - 4 Seminars on Traffic Signal Activities by  
International Municipal Signal Association.
- 2 - Controller Repair Seminar - Wellesley
- 3 - 2 Factory Inspections of New Digital Equipment  
Connecticut - Massachusetts
- 4 - Inspection of Fog Detection Equipment - Conn. DOT

In addition the Traffic Maintenance Unit conducted three meetings with the District Traffic Maintenance Engineers to coordinate Statewide Traffic Maintenance Policies.

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MAINTENANCE SECTION

TRAFFIC SIGN MAINTENANCE

FORCE ACCOUNT MAINTENANCE

Force Account maintenance of signs continues to be a never ending struggle to perform the necessary tasks without sufficient equipment and personnel.

The installation of mile and tenth-of-mile markers on all numbered routes, state highway and non-state highway, and the current adoption of a Department policy to speed zone all non-state highway numbered routes add immeasurably to the already overburdened tasks of force account sign maintenance.

As a result of a letter from the Maintenance Engineer to all District Highway Engineers, increased activity in the area of force account sign washing was evidenced during the past fiscal year. It is hoped that all Districts will be able to find time for sign washing during the next fiscal year, since it is a necessary facet of sign maintenance.

Each year during seasonable weather it is necessary to restripe pavement markings deteriorated through the winter months and much of this work is done by force account. During this period force account sign maintenance has to take a back seat to pavement striping.

In an attempt to remedy this situation, one District has set up a full time District Sign Section. This Section is comprised of one of their Traffic Maintenance Sections and is to be responsible for all force account sign maintenance work. It is hoped that they can obtain all the equipment necessary to perform this work efficiently. This is but one example of a trend toward centralized work activities.

CONTRACT SIGN MAINTENANCE

There were 2 contracts for sign maintenance work awarded during Fiscal 1972.





The first contract awarded was a posted contract for Washing Traffic Signs in District 8 on the Northeast Expressway, Central Artery and Southeast Expressway. The quantity of work bid on was 35 hours. The only bid received was for \$37 per hour which made the total cost of the Contract \$3145.00. This contract was very successful and it is expected that similar contracts for sign washing will be awarded during Fiscal 1973 to supplement force account work in this area.

The other Contract for sign maintenance awarded during the past fiscal year is a Statewide Contract for the Fabrication and Erection of Traffic Signs and Supports, through Fiscal 1973.

This contract contains an item for Aluminum Roadside Billboard Guide Sign Panels by the Square Foot and items for Structural Steel Breakaway Sign Supports.

This is a service-type contract in which the Contractor can be called upon to install a sign, support or sign and supports on any inter-state or state highway in the Commonwealth.

Only one bid was received for this work, at a total cost of \$88,135.00. Of this amount, \$28,902.50 will be Fiscal 1972 Sign Maintenance Funds and the remainder will be subject to available Fiscal 1973 Funds.

#### BREAKAWAY SIGN SUPPORTS

In a letter from the Maintenance Engineer to the District Highway Engineers all Districts have been instructed that in order to conform to Department Standards all ground-mounted signs are to be on breakaway supports.

The Maintenance Contract for breakaway supports for billboard guide signs is one step toward conformance in this area. A second step in this direction was taken by the Traffic Maintenance Section when they replaced the annual contract for 4" round steel posts with an annual contract for round steel breakaway posts, which are to be installed by force account.



Since all ground-mounted sign supports are to be of the breakaway type, it is essential that Traffic Maintenance Forces have the equipment and know-how to install and maintain these supports.

The Traffic Sign Maintenance Engineer has been to several of the Districts during the past Fiscal Year to supervise in the repair of breakaway sign supports. Also, detailed instructions on the installation and/or repair of breakaway sign supports were prepared by the Traffic Maintenance Section and sent to all the Districts.

Most of the Districts have already purchased torque wrenches calibrated in inch pounds for use on the base plate bolts of breakaway supports and it is expected that the other Districts will have these in the near future. The procedure for tightening the fuse plate bolts requires the use of a bolt tension calibrator and a torque wrench calibrated up to 600 foot pounds. The Maintenance Section has recently purchased two of each of these.

Breakaway sign supports continue to function as desired upon impact. There were several breakaway installations hit during Fiscal 1972 with no serious injury or damage to vehicles, signs or supports reported.

There were several wind failures of breakaway sign supports reported during Fiscal 1972. Some of these failures occurred at the base connection and others at the fuse plate connection. The Traffic Maintenance Section has requested reports from all the Districts on any known wind failures. A summary of these reports will be made and forwarded to Traffic Engineering.

#### SLOW-MOVING VEHICLE PROBLEM

Through the guidance of the Registrar of Motor Vehicles a new safety standard was developed for slow-moving vehicles.

According to this standard the Maintenance Division will require that all its vehicles and all Contractors' vehicles, on Maintenance



Contracts, that are designed to operate at a maximum speed of 25 M.P.H. shall have a slow-moving vehicle emblem permanently affixed and that those vehicles that operate from time to time for a period of one half hour or more at a speed of 25 M.P.H. or less shall have a slow - moving vehicle emblem temporarily affixed.

DELINEATION

The replacement of knockdown delineators continues to be a major maintenance problem. In an effort to alleviate this problem, the Traffic Maintenance Section initiated the purchase of 8000 flexible delineator posts during Fiscal 1972. These posts are to be installed by the Districts in high - impact areas, such as sharp ramps and gores.

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES

The Department is in the process of reviewing the 1971 Federal "Manual on Uniform Traffic Control Devices" with the intent of adopting it as the new Department Manual to the extent that Massachusetts Law will allow.

The Traffic Maintenance Section has been involved in this review, through representation at the weekly review meetings.

ACTIVITY CODES

A listing of proposed Activity Code Numbers for Traffic Sign Maintenance was prepared by the Traffic Maintenance Section during Fiscal 1972.

The intent is to assign a separate Activity Code Number to each phase of Traffic Sign Maintenance work.

SIGN SUPPORT DEMONSTRATIONS

The Traffic Sign Maintenance Engineer with people from the Unistrut Corporation conducted demonstrations on the correct installation procedures for Telespar telescopic breakaway sign supports in all the Districts during the week of May 22-25.

HIGHWAY CAPACITY SCHOOL

The Traffic Sign Maintenance Engineer attended a Highway Capacity





Course sponsored by the Department and conducted by members of the staff of the Brooklyn Polytechnic Institute during the week of February 14-18.

#### EXPERIMENTAL WORK

During Fiscal 1972 several experimental products were tested and some were purchased for further evaluation, as follows:

1. Fasteners for small signs and delineators were purchased for further evaluation by Districts 4 and 6.
2. A reflectorized paint was applied to a bridge abutment adjacent to a hazard marker, with the idea of using paint instead of hazard marker panels.

The hazard marker showed more reflectivity at night.

3. A portable robot flagman was employed as a traffic warning device in actual work operations. It proved to be effective, but the flag motions don't conform to the new Federal Manual on Uniform Traffic Control Devices.

4. A new detergent for sign washing was demonstrated and found to be very effective. District 7 will purchase some for further field evaluation.

5. High intensity sheeting was used on several hazard markers in place of prismatic reflectors. Preliminary reports favor the prismatic reflectors for nighttime performance.

6. Several portable metal sign supports, some with signs, were issued to District 6 and then to District 2 for field evaluation.

7. Several new signs, most of them plastic, were added to the Wellesley Sign Test Rack for weathering and evaluation.

#### PROPOSED WORK

It is expected that during Fiscal 1973 Traffic Sign Maintenance work will be focused on the changeover to symbol signs and breakaway supports.





SIGN RECORDS

The Traffic Maintenance Unit processed the paper work for approximately 1480 sign orders and 1193 reports of weekly sign erection totals.

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SIGNAL MAINTENANCE

The traffic control signal reconstruction program revising signals to comply with the Federal Highway Administration's Manual on Uniform Traffic Control Devices was funded with \$100,000 this year. This amount was augmented with funds from various accounts as permitted by the Accounting Section. Seventeen signals were updated at a cost of \$195,184.50 in Fiscal 1972. The average expenditure to update each location was \$11,481.44. Of the Department's 546 signals, 185 have been updated by the reconstruction program.

Ten new traffic Control Signals were installed by contract at a cost of \$93,888.25 or an average of \$9,388.82 each. The average number of new installations handled by this office during any fiscal year is between 8 and 10.

Five traffic signal force account betterments were completed by various Districts this year resulting in a total expenditure of \$3,316.60.

Last year a pilot program of Contract traffic signal and flashing beacon painting was instituted. The results were so satisfactory that the program was expanded this year. Three Districts participated in the project for a total expenditure of \$47,952.50. The work also included washing the lenses, cleaning the reflector, and repairing the cement concrete base when required. The Contractor was also responsible for replacing any missing hardware. The number of items painted were:



Posts	1186	Last Arms	18
Pedestals	295	Control Boxes	182
Housings	4435		

Traffic signal maintenance problems recently have been more monetary than electrical. Whenever a signal location is reconstructed, the controller is put into a standby pool rather than retired. Although nearly 200 controllers have been released from normal service, they have disappeared into the ever widening gap between controller breakdown and its repair by a vendor. For example, some controllers take from 3 to 4 months to return from the repair shop. In addition to this, the cost per hour to repair both electromechanical and solid state controllers has increased sharply. The Department is caught in the pincer of rising costs and long repair delays.

The moratorium on hiring, especially Electricians, has aggravated the traffic signal repair problem.

#### HIGHWAY SAFETY LIGHTING

The Traffic Maintenance Unit investigated street light maintenance with a nationwide company that specializes in this field and found that most companies want to maintain the luminaires only.

The Department is faced with the decision to either purchase adequate street light maintenance equipment and hire additional qualified personnel or go to complete Contract Maintenance. In either case, considerable money is involved.

There is one thing that the Department could do to make street lighting maintenance much easier and that is to standardize the luminaire pole. The surprising thing about this is that it wouldn't cost any money. The Districts are required to purchase replacement poles rather than draw them from Wellesley Stores as it would be almost impossible for Wellesley to stock such a varied assortment as now exists on State Highways.



PAVEMENT MARKINGS

GENERAL

Fiscal 1972 saw the Department make greater strides toward assuring that the motoring public has continuous pavement markings on State Highways throughout the year.

Several factors have contributed to the increased efficiency of the Department's pavement marking program, some of these are as follows:

- 1 -Responsible funding in the Pavement Marking Account
- 2 The purchase of modern striping equipment
- 3 Experimentation that has lead to advanced product use.
- 4 Program Development by both field and administrative personnel to effect an efficient pavement marking program.

RESPONSIBLE FUNDING

The 6030-7301 Pavement Marking Account was allocated \$950,000. for expenditures in 1972. This amount of money while not assuring that the Commonwealth will have 100% coverage of pavement markings will give the highway users in Massachusetts a high degree of safe travel.

The monies allow the state forces to extend their pavement marking activities to the non-state highway numbered routes in many municipalities thus relieving the local authorities of this burden.

Expenditures from the 6030-7301 account, as usual, were divided into two types of Pavement Marking Activities:- Contractural Services and Materials for Force Account work. The breakdown of this work for fiscal 1972 was as follows:

6030-7301 Account Expenditures

A- Contractural Services		
Existing Contracts from 1971		\$128,312.07
6-2 Year Performance Contracts		159,986.13
4-1 Year Multiple Application Contracts		122,309.71

Total Fiscal	72 Contract	<u>Cost</u>	\$409,607.91
--------------	-------------	-------------	--------------

Total No. of Contracts = 18

- |              |                      |
|--------------|----------------------|
| 17 Contracts | = Rapid Drying Paint |
| 1 Contract   | = Thermoplastic      |

B - Pavement Marking Materials for Application by State Forces

Total Expenditures = \$535,621.89

Material Purchases included

- 1 - Standard Cold Paint
- 2 - Chlorinated Rubber Paint
- 3 - Hot Paint
- 4 - Reflective Glass Beads
- 5 - Paint Thinners
- 6 - Thermo-Applied Crosswalk Powder
- 7 - Thermoplastic
- 8 - Reflective Tape
- 9 - Reflective Liquid for Delineation
- 10 - Reflective Lane Tape





## MAINTENANCE SECTION

### EQUIPMENT PURCHASES

The Pavement Marking Program has been fortified by the purchase of modern striping equipment. In fiscal 1972 two Hot Paint Machines were delivered. These machines have a capacity of 250 gallons each and have the potential of striping up to three lines simultaneously.

The Hot Paint machines were delivered toward the middle of the fiscal year so the full impact of their capabilities has not been felt yet. It will take a short while to condition the men to this type of machine and it will also take time to settle on the most efficient materials for the stripes. These machines have the capabilities of applying the very fast drying materials at 180°F. and above.

The delivery of the two machines brings the total Hot Paint Machines owned by the Department to 3. This significantly increases the potential of the Department to apply pavement markings without using wet line protective devices.

In addition to the delivery of the two hot paint machines in fiscal 1972 two more pavement marking machines were purchased out of 1972 monies. These machines have hot paint capabilities but are smaller (120 gal. capacity) than the two delivered in 1972. This type machine should make ideal replacements for the present intermediate strippers. It is programmed that all of the intermediate strippers, one per District, will be replaced by the machines of the potential as those purchased out of the 1972 fiscal funds.

The structure of the pavement marking equipment program is becoming quite sound and it is hoped that progress will continue to be made until the Department has not only the hot paint capabilities in each District but also has some thermoplastic application equipment to maintain the many thousands of feet of thermoplastic pavement markings being applied each year.

In the small machine category the most improved area has been in the cross-walk and stopline category. At present the Department has 7 hand operated machines that operate by melting a thermoplastic powder to attain a pavement marking. The line produced in this case dries instantly allowing traffic to immediately pass over it. This method of application saves traffic tie-ups, smeared paint lines and man-hours required to place and pick up cones. The savings in man-hours allows for greater line marking production.

### EXPERIMENTATION

Fiscal 1972 saw the Pavement Marking Experimental work slow down from the pace of other years. This was due to the lack of adequate time for such work both from the Traffic Maintenance viewpoint and from the Research and Materials viewpoint. Not as many new products were introduced but continuous observations were made on the products that had been introduced from previous years.

Some of these observations were as follows:

- 1 - Thermoplastic Pavement Markings -  
The Durability of Thermoplastic is extended beyond that of paint but it is difficult to pinpoint an expected life because of so many factors affecting it, such as application





## MAINTENANCE SECTION

techniques, snow plowing, studded tires and traffic volume and geometrics of the roadways. On the high volume roads with thermoplastic will give an acceptable line thru one year without additional applications.

The cost of thermoplastic continues to remain high:- from 15 to 20 times the cost of a painted line.

The use of this product does however reduce the maintenance load in the pavement marking area.

### 2 -Chlorinated Rubber Paints -

The Chlorinated Rubber Paints have a perceived extension of durability over other paints, about 40% more than the least expensive paint. This material is designed to answer many of the Department needs in pavement markings. It can be applied either hot or cold with fast dry characteristics. Problems thus far have been the personnel getting used to different odor of the paint and not being able to get a consistent dry time of 180 seconds or less. This paint is the most expensive of the traffic paints.

Several states have built their striping program around the chlorinated rubber paints.

### 3- HOT PAINTS-

Hot Paint was the original product the Department has experimented with in the fast dry pavement marking materials. The experimentation was done primarily by contractual forces and the hot paints have become popular with the contractors.

The Department has applied very little Hot Paint with its own machines to the end of fiscal 1972 but fiscal 1973 is to see an increased volume of use with this material.

It can be seen that in order to get the ideal performance, i.e. 180 seconds dry or less, that all operating conditions have to be well satisfied. If the application methods, the machine performance, the material quality or the weather are not in the acceptable area then the overall performance is disappointing and wet line protection is required.

As with the Chlorinated Rubber Paints many States and authorities have built their striping program around the Hot Paint concept.

### 4- Thermo-applied powder for crosswalks and stop lines and crosswalks-

As described previously under equipment the concept of an instant drying material for crosswalk and stop line application is excellent and saves many man hours plus many hours of aggravation by the motorists for having to avoid wet line protection devices. It is expected that the cost of this material will come down in the next year since it is now a competitive bid item.



## MAINTENANCE SECTION

### 5 - Hand Applied Thermoplastic-

Continued observations have been made on a thermoplastic compound that was applied manually by a crew of men from Italy. It is a most interesting product and shows excellent durability characteristics however one big drawback to this material at this time is the method of application. The Department could not incorporate a manual operation such as this into its striping program, because of the loss of manhours during application.

### 6 - Liquid Line Remover-

A liquid paint remover was tried to eradicate painted traffic lines in late fiscal 1972. The results were most encouraging.

The only method to date to remove painted lines is to wear it off by, abrasion or sand blasting or to burn it off. All of the foregoing methods usually damage the roadway surface and are very slow operations. Also there is the cover up method of painting out a line with black paint, this involves a constant maintenance program.

The liquid remover while working efficiently cost \$10.00 per gallon which would definitely place restrictions upon its use.

## PROGRAM DEVELOPMENT

The Pavement Marking Program is developed by two methods, each equally important and each necessary to achieve the utmost efficiency out of the resources available for this work. The two methods are

- (a) Pavement Markings by Contract
- (b) Pavement Markings by State Forces

### 1 - Pavement Markings by Contract

One of the most significant developments in the Contract Painting area over the past two years was the issuance of Performance Contracts. The Performance Contracts allow the Contractor to choose a material whereby he will maintain the Pavement Markings on a certain portion of highway for a specified period of time. It is up to the contractor to choose his time of application but the lines must continually be maintained at or above the minimum standards set by the Department. The budgetary allotments allow it is estimated that all pavement marking contracts will be of this type in the future.

By preparing the Contracts for a two year period a certain amount of paper work is saved by the administrative section and it seemingly invites more competition in bidding. There are now five serious bidders on the pavement marking contracts whereas only two years ago there were only two primary bidders. The net result has been a 30±% reduction in bid prices.

Analysis reveals that the Contract Prices for painted Pavement Markings is approaching that of Force Account Striping. This is a healthy economic situation and fortifies the determination that to have both a combined contract and Force Account striping system is justifiable.



MAINTENANCE SECTION

2 - Pavement Markings by Force Account -

The Force Account operations are slightly behind the Contractural operations in sophistication. This is done deliberately in order that the Department will not unknowingly enter into a costly innovation without first having someone else experiment with the method.

However the Force Account Pavement Marking program is of such proportions so as not to place the Commonwealth in the danger that a Contractural boycott of Pavement Marking Activities would lead to immediate danger to the traveling public.

It can be seen that, as the Force Account Activities continue, more centralized and more specialized tasks will have to be developed. With pavement marking machines ranging over \$40,000.00 in price it no longer is possible to have interchangeable personnel operating and maintaining these, complicated units. Field personnel have realized this and have adjusted their personnel assignments to effect the most efficient operation of their operating units.

It is hoped that those responsible for the establishing of Traffic Maintenance positions will acquaint themselves with the continual progress being made in this vital Traffic Maintenance Area and establish a permanent Table of organization for these Activities.





MAINTENANCE CONTRACT'S SUMMARY

	CATCH BASIN CLEANING	WELL DRILLING	HIGHWAY CLEANING	CHAIN LINK FENCE	CHEMICAL SHED	TOTAL
& ICE	19	8	20	27	15	89
	SIGNAL MAINT.	SIGNAL RECONSTR.	SIGNAL CONSTR.	HIGHWAY PAINTING		
IC	2	17	10	18	--	47
	PAINTING	MISC. BETTERMENTS	FOREMEN'S GARAGES	REPAIRS ADMIN. BLDG.		
CTURES	22	11	4	4	--	41
	MOWING	TREE REMOV.	TREE TRIM.	MIST BLOWER SPRAY	SOIL STERILANT	
SIDES	97	15	8	7	8	
	TRAVEL TRASH	TREE PLANT- ING				
	13	8	--	--	--	156
	SURFACE TREATMENT	NANTUCKET MAINT.	DRAINAGE BETTERMENTS	RESURFACING		
WAYS	22	1	2	41	--	66
						399





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## DIVISION OF WATERWAYS

The Division of Waterways as most recently reorganized under Chapter 821 of the Acts of 1963 is a separate Division within the Department of Public Works. Its duties and functions are separate from the so-called Highway Division of the Department and are outlined in Chapter 91 of the General Laws. In addition to the duties and functions as outlined in Chapter 91 of the General Laws, the legislature by means of special legislative acts and resolves authorizes and directs the department of public works through its division of waterways to perform functions that are beyond the scope of Chapter 91.

A list of the chief functions and responsibilities of the Division of Waterways follows:

### UNDER CHAPTER 91

1. The design and supervision of construction of shore protection, harbor improvement and development, stream clearance and flood control projects throughout the Commonwealth. Design is performed either with the Division's own staff or by consulting engineers. Supervision of construction is with our own staff.
2. Issues licenses for structures in certain rivers, tide-waters and great ponds; and permits for dredging. All licenses and permits are issued after a public hearing has been held.
3. Makes field inspections to see that work for which licenses or permits have been granted comply with plans.



DIVISION OF WATERWAYS

UNDER CHAPTER 91 (Cont'd)

4. In charge of great ponds (over 1300), Commonwealth tide lands, rights in land, flats, shore and tidewaters (over 1900 miles of tidal shore).
5. Acts as the coordinating agency for Federal harbor development and shore protection projects done on a cooperative basis (i.e.; in some cases only fiscal cooperation and in other cases both fiscal and engineering cooperation).
6. In charge of the State Piers at Plymouth and New Bedford and Pilgrim Memorial Park in Plymouth (Plymouth Rock and surrounding area).
7. Leases Fall River and Gloucester State Piers. Makes certain repairs and reconstruction to said piers as authorized by Special legislation.

UNDER SPECIAL LEGISLATION

1. Acts as the contracting agent for the Public Access Board. As such represents the Commissioner of Public Works at meetings of the Board. Designs and supervises construction of public boat launching sites approved by the Public Access Board.
2. Acts as the contracting agent for the Department of Natural Resources for the design and construction of recreational facilities such as swimming pools and skating rinks outside the Metropolitan District Commission.



DIVISION OF WATERWAYS

UNDER SPECIAL LEGISLATION (Cont'd)

3. Under Chapter 595 of the Acts of 1970, the duties of the County Commissioners relative to the construction, supervision and maintenance of dams and reservoirs were transferred to the Commissioner of Public Works, who has assigned the duties to the Division of Waterways. The Division is receiving assistance from the Highway Districts, who have assigned personnel to make inspections and prepare reports.
4. The Division in cooperation with the Massachusetts Port Authority; the U. S. Coast Guard; U. S. Army Corps of Engineers; the Mass. Department of Public Health; the Attorney General's Office; and the Boston Harbor Committee on Pollution, is preparing a program aimed toward cleaning up navigational, health, and safety hazards in Boston Harbor and other coastal waters.
5. Under Chapter 870 of the Acts of 1970, a special fund was created to be known as the "the Harbors and Inland Waters Maintenance Fund."

The work to be done from the monies in this fund consists of the continuous maintenance, dredging, and cleaning of the harbors, inland waters and great ponds of the Commonwealth in order to protect the wetlands of the Commonwealth.





DIVISION OF WATERWAYS

UNDER SPECIAL LEGISLATION (Cont'd)

6. The Division of Waterways is the representative for the Commissioner on the following commissions and boards:

- |                               |           |
|-------------------------------|-----------|
| 1. Water Resources Commission | Monthly   |
| 2. Public Access Board        | Monthly   |
| 3. Connecticut River Compact  | Quarterly |
| 4. Thames River Contract      | Quarterly |



DIVISION OF WATERWAYSCONSTRUCTION CONTRACTS AWARDED - July 1, 1971 to June 30, 1972

<u>CONT. NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>CONTRACTOR</u>	<u>COST</u>
118-B	Attleboro	Swimming Pool	John H. Follouris	\$ 322,700.00
2744	Barnstable	Jetty Extension	Peter P. Cook	5,540.00
71 PA	Boston	Boat Ramp	Spiniello Constr.	139,440.00
2749	Bourne	Pier Repairs	Rev-Lyn Contr.	23,420.00
119-B	Brookton	Swimming Pool	Rich Constr. Co.	389,000.00
120-B	Chicopee	Swimming Pool	T. A. Daley & Sons	423,620.00
2735	Dedham	Stream Improvements	G. Bonazzoli & Sons	77,190.00
2745	Dennis	Revetment	Fernandes Crane	5,400.00
2742	Eastham	Stone Groins	Fernandes Crane	11,140.00
P.O.	Fall River	State Pier-Fenders	Fairhaven Marine	950.00
2733	Fall River	State Pier - Loading Buoys	Don-Gee Corp.	1,700.00
121-B	Fall River	Swimming Pool	John H. Follouris	404,000.00
120-B	Fall River	Skating Rink	Alree Constr. Co.	1,098,400.00
121-B	Franklin	Skating Rink	J.A.Sullivan Corp.	1,096,000.00
132-B	Holyoke	Skating Rink	D.A.Sullivan	1,128,350.00
122-B	Lawrence	Swimming Pool	L.C.Cyr	386,950.00
126-B	Leominster	Swimming Pool	Leominster Engr.	335,000.00
124-B	Lowell	Swimming Pool	Salem Engr.	392,130.00
2741	Manchester	Stream Improvements	T.F.Wiley Constr.	49,840.00
114-B	Marlboro	Skating Rink	J.A.Sullivan	1,106,000.00
2738	Norbury	Dam Construction	Petrucci Constr.	319,090.00
P.O.	New Bedford	State Pier Bldg. Repairs	Lapre, Inc.	950.00
141-B	New Bedford	Skating Rink	D. Antonellis, Inc.	1,079,000.00
2719	Norfolk	Flood Control	R.A.Bonazzoli & Son	226,570.00
125-B	North Adams	Skating Rink	Petrucci Constr.	34,000.00



DIVISION OF WATERWAYSCONSTRUCTION CONTRACTS AWARDED - July 1, 1971 to June 30, 1972 (Cont.)

<u>CONT.</u> <u>NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>CONTRACTOR</u>	<u>COST</u>
2717	Orleans	Bulkhead	Hydro-Dredge Corp.	\$ 118,710.00
2737	Peabody	Flood Control	T & T Construction	141,700.00
2722	Plymouth	Town Wharf Repairs	H.W.Kiang & Son	17,630.00
133-B	Plymouth	Skating Rink	D. Antonellis	1,098,000.00
2739	Quincy	Sea Wall	F.X.Messina	20,650.00
2651	Quincy	Concrete Sea Wall	Ernest Minelli	49,680.00
2729	Quincy	Shore Protection	D.F.Frangioso	131,160.00
2718	Quincy	Sea Wall	Ernest Minelli	73,120.00
2751	Sandwich	Groins	Gracie Bros.	74,800.00
09-B	Sandwich	Beach Improvements	Henley Lundgren	343,770.00
9 P.A.	Shrewsbury	Boat Ramp & Facil.	Henley Lundgren	37,430.00
25-B	Southbridge	Swimming Pool	A. Mason & Sons	342,490.00
26-B	Springfield	Swimming Pool	T. A. Daley & Sons	413,970.00
17-B	Taunton	Skating Rink	D. Antonellis	1,111,000.00
0 P.A.	Wareham	Boat Ramp & Facil.	Henley Lundgren	89,740.00
740	Weymouth	Shore Protection	F.X.Messina	32,600.00
742	Winthrop	Harbor Improvements	Frank Ganter Co.	39,860.00
731	Winthrop	Drainage Outlet	Bonacorso Constr.	45,410.00
754	Winthrop	Dredging	Hydro-Dredge Corp.	58,190.00
2 P.A.	Winthrop	Public Access Facil.	State St. Engr.	34,480.00
7-B	Worcester	Swimming Pool	J.A.Sullivan	412,000.00
671	Worcester	Stream Improvements	D.DiMartino Constr.	613,650.00
47 Projects		Total Cost		\$14,715,220.00





DIVISION OF HIGHWAYSCONSTRUCTION PROJECTS COMPLETED JULY 1, 1971 to June 30, 1972

<u>COMPL. NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>CONTRACTOR</u>	<u>COST</u>
2742	Bowline	Pier Repairs	Nov-Lyn Constr.	23,420.00
2745	Dennis	Shore Protection	Fernandes Crane	5,382.00
2742	Wastham	Beach Groins	Fernandes Crane	11,243.00
2733	Fall River	State Pier - Dock Repairs	Ren-Con Corp.	1,699.00
P.O.	Fall River	State Pier - Fender Repairs	Fairhaven Marine	950.00
2722	Gloucester	Fish Pier - Fender Piles	Roy B. Rendle	18,325.00
2732	Harwich	Saquatucket Har- bors	P.C.A. Constr.	51,084.00
2710	Marshfield	Shore Protection	Ernest Minelli	21,605.00
P.O.	New Bedford	State Pier - Bldg. Repairs	Dupre, Inc.	950.00
2715-2	New Bedford	Skating Rink	D. Antonelli	1,091,143.00
2715	Newburyport	Sea Wall	Ernest Minelli	156,000.00
2720	Peabody	Flood Control	R.A. Luciani & Sons	141,903.00
2716-E	Peabody	Skating Rink	D. Antonelli	1,011,754.00
2702	Plymouth	Sea Wall	Giaccia Bros.	57,163.00
2725	Plymouth	Bulkhead Repairs	G. Bonassoli	126,502.00
2651	Quincy	Shore Protection	Ernest Minelli	49,679.00
2739	Quincy	Sea Wall	F. X. Mossina	20,650.00
67 P.A.	Sandwich	Boat Ramp	Raso Constr. Co.	16,200.00
2714	Scituate	Sea Wall	G. Bonassoli	75,315.00
69 P.A.	Shrewsbury	Boat Ramp	Kenley-Lundgren	27,438.00
2682	Southbridge	Stream Improvements	Northeastern Constr.	27,489.00
2726	Wakefield	Stream Improvements	Wales Corp.	121,823.00
2707	Wareham	Dredging	No. Atlantic Dred.	178,695.00
2664	Weymouth	Flood Control	G. Bonassoli	1,060,269.00





DIVISION OF WATERWAYS

CONSTRUCTION PROJECTS COMPLETED JULY 1, 1971 to JUNE 30, 1972 (Cont.)

<u>CONT. NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>CONTRACTOR</u>	<u>COST</u>
740	Weymouth	Shore Protection	P.F. Mossina Gen.	\$ 22,600.00
727	Winthrop	Sea Wall	R.L. Spencer Co.	20,941.00
P.A.	Winthrop	Boat Ramp	Vitale & Sons	143,232.00
743	Winthrop	Harbor Improvements	Frank Ganter Co.	<u>29,865.00</u>
		28 Projects Completed	Total	\$4,615,000.00



DIVISION OF WATERWAYS

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PROJECTS UNDER CONSTRUCTION AS OF JUNE 30, 1972

<u>CONTRACT #</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>CONTRACTOR</u>	<u>EST. COST</u>
18B	ATTLEBORO	SWIMMING POOL	JOHN H. FELLOURIS	\$ 322,700.00
19B	BROCKTON	SWIMMING POOL	RICH CONSTRUCTION CO.	\$ 389,000.00
20B	CHICOPEE	SWIMMING POOL	T.A.DALEY & SONS	\$ 423,619.00
21B	FALL RIVER	SWIMMING POOL	JOHN H. FELLOURIS INC.	\$ 404,000.00
30B	FALL RIVER	SKATING RINK	ALRAE CONSTRUCTION CO.	\$1,098,400.00
31B	FRANKLIN	SKATING RINK	J.A.SULLIVAN CORP.	\$1,096,000.00
32B	HOLYOKE	SKATING RINK	D. A. SULLIVAN	\$1,128,349.00
22B	LAWRENCE	SWIMMING POOL	L.C. CYR	\$ 386,500.00
36B	LEOMINSTER	SWIMMING POOL	LEOMINSTER ENGR. CO.	\$ 335,000.00
24B	LOWELL	SWIMMING POOL	SALEM ENGINEERING CO.	\$ 392,129.00
14B	MARLBORO	SKATING RINK	J. A. SULLIVAN	\$1,106,000.00
738	MONTEREY	GARFIELD DAM	PETRICCA CONSTR. CO.	\$ 319,092.00
719	NEWTON	FLOOD CONTROL	R. A. BUCCELLA & SON	\$ 226,505.00
693	NO. ATTLEBORO	ACCESS RAMP	T & T CONSTRUCTION CO.	\$1,947,735.00
41B	NEWBURYPORT	SKATING RINK	D. ANTONELLIS INC.	\$1,079,000.00
717	ORLEANS	BULKHEAD	HYDRO-DREDGE CORP.	\$ 94,556.00
737	PEABODY	FLOOD CONTROL	T & T CONSTR. CO.	\$ 144,700.00
33B	PLYMOUTH	SKATING RINK	D. ANTONELLIS	\$1,098,515.00
09B	SANDWICH-I	BEACH IMPR.	HENLEY-LUNDGREN	\$ 643,772.00
25B	SOUTHBRIDGE	SWIMMING POOL	A. MASON & SONS	\$ 342,491.00
26B	SPRINGFIELD	SWIMMING POOL	T. A. DALY & SONS	\$ 413,970.00
17B	TAUNTON	SKATING RINK	D. ANTONELLIS INC.	\$1,111,000.00
OP.A.	WAREHAM	PUBLIC ACCESS	HENLEY-LUNDGREN CO.	\$ 89,741.00
731	WINTHROP	LEWIS LAKE	BONACORSO CONSTR. CORP.	\$ 45,412.00



DIVISION OF WATERWAYS

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<u>CONTRACT #</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>CONTRACTOR</u>	<u>EST. COST</u>
754	WINTHROP	DREDGING	HYDRO-DREDGE CORP.	\$ 58,185.00
671	WORCESTER	ARARAT BROOK	D.DIMARTINO CONSTR. CORP.	\$ 618,648.00
27B	WORCESTER	SWIMMING POOL	J. A. SULLIVAN	\$ 412,000.00
40B	LOWELL	SKATING RINK	D. LIBERO CONSTR. CO.	<u>\$1,043,000.00</u>
		28 PROJECTS UNDER CONSTRUCTION TOTAL		\$15,017,019.00



DIVISION OF WATERWAYSPROJECTS UNDER DESIGN OR IN PROCESS AS OF JUNE 30, 1972

<u>CONTRACT #</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>EST. COST</u>	<u>REMARKS</u>
145B	AGAWAM	SWIMMING POOL	\$375,000.00	
139B	AUBURN	SKATING RINK	\$1,200,000.00	TOWN TO ACQUIRE SITE
73P.A.	BREWSTER	ACCESS RAMP	\$33,000.00	DESIGN 100%
	CHATHAM	DREDGING	\$25,000.00	" 80%
	CHATHAM	BEACH STUDY	\$185,000.00	
146B	CLINTON	SWIMMING POOL	\$375,000.00	
2728	CLINTON	COUNTERPANE BROOK	\$25,000.00	DESIGN 90%
	DALTON	WACONAH FALLS BROOK	\$9,000.00	" 40%
	DANVERS	BEAVER BROOK	\$10,000.00	
	DANVERS	ACCESS RAMP	\$105,000.00	DESIGN 80%
	DEDHAM-V	STREAM IMPR.	\$70,000.00	" 80%
	DENNIS	HAIGIS BEACH	\$85,000.00	
2747	EASTHAM	GROIN	\$22,400.00	DESIGN 85%
2757	FALMOUTH	DREDGING	\$50,000.00	" 70%
2699	FALMOUTH	SHORE PROTECTION	\$70,000.00	" 70%
	FALL RIVER	BULKHEAD	\$1,800,000.00	
2748	FALL RIVER-II	ROOF REPAIR	\$35,000.00	DESIGN 50%
	FALL RIVER I	ROOF REPAIR	\$2,500.00	UNDER NEGOTIATION
148B	GARDNER	SKATING RINK	\$1,200,000.00	TOWN TO PROVIDE SITE
2760	GLOUCESTER	WRECK REMOVAL	\$16,250.00	TO BE BIDS/OPENED 8.1.72
	HADLEY	ACCESS RAMP	\$70,000.00	DESIGN 20%





<u>CONTRACT NO.</u>	<u>LOCATION</u>	<u>TYPE OF WORK</u>	<u>EST. COST</u>	<u>REMARKS</u>
	HARWICH	DREDGING	\$54,000.00	
	HINGHAM	STONE REVETMENT	\$45,000.00	DESIGN 30%
	IPSWICH	MILES RIVER	\$10,000.00	" 20%
2758	MANCHESTER	DREDGING	\$160,000.00	" 95%
2547	MANSFIELD	STREAM IMPR.	\$70,000.00	
2759	MARBLEHEAD	WHARF	\$37,000.00	DESIGN 30%
	METHUEN	SWIMMING POOL	\$375,000.00	
	MIDDLEBOROUGH	NEMASKET RIVER	\$20,000.00	DESIGN 60%
2703	MILFORD	DAM	\$475,000.00	" 100%
	NEW BEDFORD	PUBLIC LANDING	\$9,000.00	
2629	QUINCY	SEA WALL STAIRS & REPAIRS	\$10,000.00	DESIGN 20%
	QUINCY	SHORE PROTECTION	\$67,000.00	" 10%
134B	ROCKLAND	SKATING RINK	\$1,250,000.00	" 100%
	SALEM	SOUTH RIVER-FLOOD CONTROL	\$800,000.00	" 100%
	SANDWICH-II	BEACH IMPROVEMENTS	\$153,000.00	" 90%
	SANDWICH-III	BEACH IMPROVEMENTS	\$200,000.00	" 30%
	SWAMPSCOTT	BEACH EROSION STUDY	\$10,000.00	
	SWAMPSCOTT	HAWTHORNE BROOK ST.	\$375,000.00	DESIGN 100%
	SWANSEA	STREAM IMPROVEMENTS	\$20,000.00	
2761	TISBURY	DREDGING	\$88,200.00	
	WEBSTER	PUBLIC ACCESS	\$50,000.00	DESIGN 20%
	WEST NEWBURY	ACCESS RAMP	\$40,000.00	
2755	WELLFLEET	TIDEGATE REPAIRS	\$136,000.00	DESIGN 100%
2704	WORCESTER	FLOOD CONTROL	\$500,000.00	" 75%
	\$ \$ PROJECTS	TOTAL	\$10,717,350.00	



DIVISION OF WATERWAYS

At the annual Division of Waterways Rivers and Harbors Hearing held April 6, 1972, the Division heard petitions from 61 municipalities for proposed projects to be done under the provisions of Chapter 91 of the General Laws. These 61 petitions represent over 125 separate projects, as many municipalities petitioned for more than one project.

The Division during fiscal 1972 held numerous public hearings for petitions for structures in, over or under tidewaters, great ponds and certain streams, and for excavation or dredging in the same. As a result of these public hearings approximately 120 licenses and 20 permits were granted.

Approximately \$55,000 was received for fees for rights and privileges granted under licenses in the Commonwealth tidelands.

The Division made over 250 field inspections to see that work done complied with the license or permit.

The Division under the provisions of Chapter 130, Section 27A and of Chapter 131, Section 40 of the General Laws (the so-called Jones and Hatch Acts) receives notices from persons planning to fill or dredge in coastal or inland waters. The Division's function is to determine what jurisdiction, if any, comes under the provisions of Chapter 91 of the General Laws. Approximately 400 to 500 such notices are received annually.

In the fiscal year 1972, under Chapter 595 of the Acts of 1970, approximately 320 dams have been inspected; approval given for new dams (18); dams removed from inspection list (20); and approval given for alterations to existing dams (3). Under Chapter 595 of the Acts of 1970, there are over 3200 dams in the



DIVISION OF WATERWAYS

Commonwealth involved that require periodic inspection.

The Division annually reviews an average of 70 Land Court cases where rights of the public have to be protected in tide-waters and Great Ponds.

The Division during the fiscal year of 1972 supervised the transportation and offshore burning of combustible solid waste material from building demolition. Over two hundred thousand tons of material were involved and it was towed to sea approximately 12 miles, well beyond the territorial limits of the Commonwealth for combustion.



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BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

The Bureau of Transportation Planning and Development, Massachusetts Department of Public Works, was established in 1964 under Section 3A of Chapter 16 of the General Laws. The executive and administrative head of the Bureau is the Director of Transportation Planning and Development.

This Bureau serves as the principal source of transportation planning in the Commonwealth and conducts research, surveys, demonstration projects, and studies in cooperation with the Federal government, other governmental agencies, and appropriate private organizations and is responsible for the continual preparation of comprehensive and coordinated transportation plans and programs. In addition, it maintains a data bank of all available transportation information statistics for reference use by all public agencies in the Commonwealth.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

A. STATEWIDE HIGHWAY PLANNING

ROAD INVENTORY

RURAL AND URBAN INVENTORY PROGRAM

Now beginning the fourth year of the Five-Year update schedule, the Rural and Urban Inventory Program achieved a higher visibility during Fiscal 1972 than at any time in the past. Increased numbers of public and private agencies and local communities expressed interest in the program and many made use of the ever-expanding data bank. In conjunction with the Computer Section, new coding and printing procedures were devised to service better these data requests.

Two new major users, now being serviced with inventory data, are the National Bridge Inspection Program Inventory, and the Federal-Aid Primary - Type II (TOPICS) programs.

To date, field work has been completed in Berkshire, Franklin, Hampshire, Hampden, Suffolk, Essex, and Middlesex counties, with work in Norfolk County 80% completed. Office work, which includes the input of data relating to functional classification, Federal-Aid Systems, traffic counts, etc., in addition to coding and editing field data, is keeping pace despite an increased workload brought on by the new coding format. As readied, printouts of the inventory have been



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

delivered to the District Highway Engineers for their distribution to local city and town officials for their review and comment.

Equipment breakdowns and incomplete staffing, added to certain restrictions and curtailments placed upon the overall program, have necessitated changes being made in the schedule which upset the Five-Year Plan.

The elasticity and adaptability of the program was, once again, tested and proven in meeting the needs of the FHWA for an amended railroad-highway grade crossing inventory showing the FAP Type II System and reflecting the changes caused by the designated interim Federal-Aid Urban System in the urbanized areas of the Commonwealth.

DEFENSE ROUTES BRIDGE RECORD

The Bridge Record is in the process of being revised and updated. A new map is to be prepared to accompany the revised report.

This report shows the load carrying capabilities, horizontal and vertical clearances of all highway structures which may be used for large movements of military personnel, equipment and supplies or for civil defense purposes in or through the Commonwealth.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

NATIONAL BRIDGE INSPECTION PROGRAM INVENTORY

The Federal-Aid Highway Act of 1970 requires an inventory of all bridges on the Federal-Aid Highway Systems by July 1, 1972 and all other bridges by July 1, 1973.

The Statewide Section through its inventory data bank has furnished information on bridges to the extent listed as follows:

<u>County</u>	<u>Number of Bridges</u>
Berkshire	469
Franklin	351
Hampshire	289
Hampden	524
Essex	479
Suffolk	312
Norfolk	73
Middlesex	11
Bristol	49
Worcester	10
	<hr/>
TOTAL	2567

Additional information will be furnished as our road and street inventory program is completed in the remaining counties in the State.

INTERSTATE TRAVELED-WAY FLOW MAP

The data for the 1971 Traveled-Way Traffic Map were compiled and transmitted to the Federal Highway Administration for inclusion in their National System of Interstate and Defense Highways Map.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

STATEWIDE CLASSIFICATION AND NEEDS STUDY

CLASSIFICATION PHASE

The highway functional classification phase is a continuing effort and is being utilized as the base for systems development on statewide, regional, and local levels.

The initial development of the Federal-Aid Primary Type II networks in urban areas in conjunction with the TOPICS Program has been developed for 145 communities in the Commonwealth.

The new Federal-Aid Primary Urban System in the urbanized areas of the Commonwealth was developed from the highway functional classification plan.

Functional classification data are being used by consultant firms in connection with their work on Master Plans (701 studies) for local communities.

NEEDS PHASE

The needs phase is a continuing effort and includes the following:

Furnishing needs data to various consultant firms in connection with their work on Master Plans (701 studies) for local communities.

Developing and updating needs information, capacities, road and street conditions for use in various studies.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

Needs data on access roads and streets were used in the Statewide Airport Study presently being conducted.

Needs data for 151 communities in the Eastern Massachusetts Regional Planning Project area were furnished to the consultant firm of Peat, Marwick, Mitchell & Co. (PMM) for their use in the validation of the present model. The results of the PMM study were to be used as input for the study being conducted by the Boston Transportation Planning Review.

FISCAL PHASE

Maintenance of current status for the continuing Finance Study involved attention to the original 500 tables and reports. Such material was augmented and new material developed from the reports of Federal, State, County, and local governmental agencies as well as from transportation authorities, private organizations, and other sources. There was an increase in the number of requests for information not contained in regular reports.

Maintenance and refinement of finance information and production of regular supplementary and special reports involved compilations for use in future updates of earnings-credit, incremental, vehicle classification and other analyses.



NATIONAL HIGHWAY FUNCTIONAL CLASSIFICATION AND NEEDS STUDY

The 1972 National Needs Report was submitted to Congress by Secretary Volpe in response to Senate Joint Resolution 81, enacted in 1965. Under this resolution a report to Congress is required every two years, beginning in January 1968, on the nation's future highway needs.

In May of 1971, the Department submitted the highway needs report to the U. S. Department of Transportation. These needs were developed in accordance with Manual B of the National Transportation Needs Study. A copy of this report and the findings of the study were made available to the Office of the Governor for use in the Massachusetts Transportation Needs Study of all modes of transportation.

Members of the Statewide Section were assigned to assist the Governor's staff in selecting priorities submitted by regional planning agencies and the Department to develop a Capital Improvement Program for alternative funding levels as set forth in the study manuals.

A draft of Manual 1, General Information, published by the U. S. Department of Transportation for the 1974 National Transportation Study has been delivered to the Department for review.

Other activities include furnishing classification and needs data to other agencies and consultant firms in connection with their work on planning studies.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

FEDERAL-AID SYSTEMS

COORDINATION OF FEDERAL-AID ROUTES AT STATE LINES

During this period, coordination of all Federal-Aid routes at state lines was completed for the states of New Hampshire and Rhode Island.

A meeting with New Hampshire officials at Seabrook, New Hampshire was necessary to finally resolve all state-line conflicts. Several route-change submissions and Federal Highway Administration approvals were required in this effort.

It is our goal to coordinate all Federal-Aid routes at state lines.

URBAN SYSTEMS

After the initial submission of the Federal-Aid Urban System to the Federal Highway Administration in 1971, there were still eight communities that had not yet approved or signed the system maps. Meetings were scheduled with the communities to review the urban system. During this period of review, five communities signed the plans leaving three not signed. This Department is in communication with the three communities and will continue in our efforts to reach accord.

Federal-Aid secondary route change requests for Pittsfield, Lawrence and Andover were submitted to and approved by the





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

Federal Highway Administration in order that required urban system routes might be substituted.

Urban Routes 6007 and 7651 in the Boston-Roxbury Section: Tremont Street, Columbus Avenue and New Dudley, Roxbury and Dudley Streets were submitted to and approved by the Federal Highway Administration.

TYPE II SYSTEMS FOR TOPICS

Distribution of area-wide TOPICS Type II Systems approvals have been made on a continuing basis to various planning units.

FEDERAL-AID ROUTE LOGS

Work on Federal-Aid route logs has produced a draft copy for Primary and for Secondary routes, although additional work is necessary to produce finished books.

Form PR 455 Route Logs, on which is shown a brief description of each Federal-Aid Primary and Secondary Route, were produced, but have not yet been edited for distribution.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

HIGHWAY STATISTICS

RURAL AND URBAN HIGHWAY MILEAGE ANALYSIS

Annual Mileage Reports for the year ending December 31, 1970 were completed and forwarded to the Federal Highway Administration.

Work is in progress on the Annual Mileage Reports for the year ending December 31, 1971.

Highway mileages, both local and State, are reported on a series of forms which are interrelated as to total mileage analysis. Each report, however, reflects a separate and individual mileage analysis.

Collectively, they represent mileages by rural, urban, and municipal classifications on all roadways within the State, which are subsequently broken down by surface types, widths, number of lanes, average daily traffic, and access control.

The following compilations were printed and distributed:

Local Road Mileage - December 31, 1970

Highway Mileage Statistics - 1970

Travel and Accident Report TA-1 portion required by Planning was completed and forwarded to the Traffic Section to be completed and forwarded to the Federal Highway Administration.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENTLOCAL HIGHWAY FINANCE ANALYSIS

Work in 1972 included collecting and analyzing the receipts and disbursements for all highway purposes by the local government units in Massachusetts. The statistical report was prepared from data usually contained in Schedule A on the annual city and town financial reports as submitted to the Bureau of Accounts, Department of Corporation and Taxation.

The collection of the data represents a considerable effort in verifying and analyzing the accounts to fulfill the detailed categories of expenditures and receipts required by the Federal Highway Administration's "535" Report. In addition, data from each of the 351 cities and towns was assembled by groups according to population for Standard Metropolitan Statistical Areas and for counties.

This report also covers information relating to the Maurice J. Tobin (Toll) Bridge of the Massachusetts Port Authority, the Callahan and Sumner Tunnels as well as the turnpike of the Massachusetts Turnpike Authority, and the public parking facilities of the Massachusetts Parking Authority.



MAPPING

FEDERAL-AID ROUTE MAPS

Black-line prints of the Federal Highway Administration and Department of Public Works approved Federal-Aid mylars of the General Highway County Series Maps were made and distributed to all interested Department officials including district offices.

With the aid of the Graphic Arts Section for drafting and the Maintenance Statistics Section for State Routes, a single sheet map of Massachusetts showing the Federal-Aid State Highway Routes was made and distribution accomplished.

TRAFFIC FLOW MAP

A traffic-flow mylar for 1969 was completed and placed on file.

GENERAL HIGHWAY COUNTY SERIES MAPS

During the year the general public has become increasingly aware of the availability and the quality of the existing General Highway County Series Maps to the extent that they have purchased \$1100 worth, choosing either books or single sheets.

Progress has been made on a new General Highway County Series Map. Suggestions from various Department heads, area planning entities, etc., in response to a questionnaire from the Director of the Bureau, have been returned citing features





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

which these respondents feel would be useful if incorporated in updated General Highway all-purpose map.

Also, meetings have been held with interested parties in an effort to select base map criteria and to determine what kind of map must be produced to satisfy nearly all requirements. Overlays have been suggested as one solution.

A contract for aerial photos was awarded to the firm of Lockwood, Kessler & Bartlett, Inc., the objective of which is to produce 9" x 9" contact photos of the entire State.

URBAN AREA BOUNDARIES

Approximately 80% of the required urban area boundary-extension submissions and redefinitions have been prepared and submitted to the Federal Highway Administration for approval.

VISIT TO VERMONT SCRIBING SECTION

A joint visit by Federal Highway Administration and Bureau personnel to the Mapping Section of the Vermont State Highway Department was made to observe various applications of the scribing technique of producing maps. As a result of this visit, a request was submitted to have sufficient monies allocated to the 1974 budget to start a Scribing Section.

The Planning Section of Region One - Federal Highway Administration has shown increasing interest in having a Scribing Section established in the Department of Public Works in the Bureau of Transportation Planning and Development.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENTTRAFFIC STUDIESTRAFFIC VOLUME COUNTING

The 1970 Traffic Volumes publication was completed and distributed. This publication contains Average Daily Traffic Volumes at approximately 3000 locations statewide. Included are all permanent, control, and coverage stations taken in 1969 and 1970 as well as all special counts taken in 1970. Since this edition became available in April approximately 130 copies have been sold to interested individuals and firms.

During Fiscal 1972 approximately 3000 volume counts were taken at continuous, control, and coverage stations. In addition about 1000 special counts were taken.

Turning movement studies and vehicle classification studies were conducted at various locations as requested for project design.

Vehicle occupancy counts and classifications were made on the Southeast Expressway at regular intervals to aid in the evaluation of the exclusive bus lane operation.

Similar counts and classifications were made at various routes on the South Shore to aid in the study of the effects of the South Shore MBTA line.



During the month of June, this section participated in the Boston Cordon Count conducted by the City of Boston's Traffic and Parking Department. Manual counts, including a modified classification, were made at all major roads entering the City.

The program for the installation of magnetic loop detectors was continued for construction, reconstruction, and maintenance projects. At present only control station locations are being considered for this type of installation.

#### VEHICLE WEIGHT AND CHARACTERISTICS

The purpose of this annual study is to establish truck characteristics relative to magnitude, composition, axle weights, gross weights, and commodities carried. The field data were processed and transmitted to the Federal Highway Administration for inclusion in the Highway Statistics Report.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

B. REGIONAL AND URBAN AREA TRANSPORTATION PLANNING

DEVELOPMENT OF THE CONTINUING TRANSPORTATION PLANNING PROCESS  
AND ASSISTANCE TO LOCAL AND REGIONAL PARTICIPATION

Over the past year, the Department, through its Bureau of Transportation Planning and Development and in coordination with the Executive Office of Transportation and Construction, regional and local agencies, has undertaken a major reorganization of the transportation planning and decision-making process throughout the Commonwealth. This reorganization has been aimed at revitalizing the process so as to meet Federal certification requirements and to achieve the goal of the Governor for the cooperative development of balanced transportation systems. The systems are to be accomplished through the implementation of plans developed cooperatively and endorsed jointly by the State, regions, localities and the private sector, within a framework of an open, participatory planning process closely linked to decision-making.

The staff effort at the state level is being directed by a Task Force, meeting on a weekly basis, on the Transportation Planning Process, which is composed of key personnel from the Department of Public Works, the Executive Office of Transportation and Construction and the Massachusetts Bay Transportation Authority. The Task Force is under the direct supervision and guidance of the Secretary of Transportation and Construction and





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

the Commissioner of the Department of Public Works. The Task Force has been assisted by two consultants, one of whom was responsible for the organizational aspects of the process, and the other for the technical aspects.

Rather than confining the development of the 3C transportation planning process to the urbanized areas alone, we are covering the entire state. The Commonwealth of Massachusetts is divided into twelve planning regions, centered around the metropolitan areas. Nine of the planning regions contain urbanized areas. Agreements are being negotiated with each of the designated planning regions. This decision to use the regional planning agencies as the focus for this revitalized transportation planning effort was the result of full consultation with the localities in the particular regional planning district (except Boston, where a different approach has been used) and their agreement to this arrangement, after open meetings were held in each of the eleven regions with the Secretary and Commissioner. Extensive investigation and discussions were held to determine the identity of the interested local groups and regional transportation issues prior to these meetings. Extensive mailings were made to the local and regional elected and/or planning officials, as well as the other identified interested persons and organizations, outlining the purpose of the meeting and enclosing



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

a draft of the issues identified for that region.

Subsequent to the original meeting with local officials and others interested in transportation planning matters in the particular region, a Memorandum of Understanding was developed. Completed drafts of the memo were then circulated to officials of the cities and towns for their comment prior to signature. Several significant modifications to the draft Memorandum of Understanding have resulted from the comments made by these local officials. The Memoranda of Understanding call for the establishment of transportation policy groups.

Each urbanized area transportation study will be part of a multi-modal total regional planning effort covering both the urbanized and non-urbanized area of each region and involving the various localities. There were differences in response by the localities in the various regions as to the detailed arrangements to be established with the regional planning agency.



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BERKSHIRE COUNTY (REGION 1) COVERING PITTSFIELD URBANIZED AREA

The original study area consisted of the City of Pittsfield and the Towns of Dalton, Lanesborough and Lenox.

Negotiations with the Berkshire County Regional Planning Commission on a mutually agreeable Memorandum of Understanding have been underway for several months and are continuing. The area to be covered will be expanded to consist of all the communities in Berkshire County.

The original Transportation Coordinating Committee in the urbanized area continues to assist the Department in comprehensive, continuing and cooperative planning.

The Department's District office has undertaken the preparation of the 1972 Annual Report of the Pittsfield Urbanized Area as an in-house effort to comply with the 3 C planning process concept.

A representative from the Department attends and participates in the Berkshire County Regional Planning Commission meetings regularly, thereby establishing liaison with their communities' members.



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FRANKLIN COUNTY (REGION 2) (NO URBANIZED AREA)

There has been extensive contact with the Regional Planning Director of the Franklin County Department of Planning concerning the development of the 3C planning process, unified work programs including water quality and solid waste, and preliminary discussion of financial support contracts. The development of a Memorandum of Understanding is still pending.





LOWER PIONEER VALLEY REGION (REGION 3) COVERING SPRINGFIELD  
URBANIZED AREA

The Springfield Urbanized Area is encompassed within the Lower Pioneer Valley Regional Planning Commission District (LPVRPC). The LPVRPC District is comprised of 43 cities and towns of Hampden and Hampshire counties.

A Memorandum of Understanding, between the Department and the LPVRPC, was signed on June 1, 1972 establishing a Joint Transportation Committee to serve the area covered by the LPVRPC. This committee will engage in both long and short term planning for the area's needs in all forms of transportation roads, rail, bus and airports.

The creation of the Joint Transportation Committee relates to the requirements of the Federal Department of Transportation for "comprehensive, continuing and cooperative planning" in all forms of transportation facilities.

A contract was signed between the Department and the LPVRPC, effective November 18, 1971 for the preparation of the 1971 Annual Surveillance Report in the continuing transportation planning progress for the Springfield Urbanized Area.

Department personnel have attended and participated in the Lower Pioneer Valley Regional Planning Commission meetings regularly, thereby establishing good liaison with the members representing their communities.



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MONTACHUSETT REGION (REGION 4) COVERING FITCHBURG-LEOMINSTER  
URBANIZED AREA

The original study area encompassed two (2) cities Fitchburg and Leominster, and two (2) towns Lunenburg and Westminster for a total of four (4) communities. The initial study was completed in 1967 and the study area is in the continuing phase of urban transportation planning.

In early June the Department of Public Works signed a new Memorandum of Understanding with the Montachusett Commission, establishing a new joint transportation committee to serve all the cities and towns within the Montachusett region.

The old Transportation Coordinating Committee has been dissolved, and the new committee will meet the requirements of the Federal Department of Transportation for comprehensive, continuing and cooperative planning. The new joint transportation committee to be formed is a grass-roots areawide transportation planning group set up to implement the objectives for open and participatory transportation planning in the Commonwealth, and will be engaged in both long and short term planning for all forms of transportation.

The Department is presently under negotiation with the regional planning agency for a contract to hire staff to serve with the Joint Transportation Committee. The contract will be



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funded from Federal and State sources.

The Department has also been under negotiation with the Federal Highway Administration for a major update in the Montachusett region, for the past two years, but to date has not resolved all of the problems to get the project started.



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CENTRAL MASSACHUSETTS REGION (REGION 5) COVERING WORCESTER  
URBANIZED AREA

The original study area comprised the City of Worcester and eleven (11) surrounding towns. The Worcester Urbanized Transportation Study report was completed and presented to the public officials of the area, and the Transportation Coordinating Committee in February 1970. The Department has been negotiating for the past year with the Regional Planning Agency and hopefully this summer the Department of Public Works will sign a new Memorandum of Understanding with the Central Massachusetts Commission, establishing a new Joint Transportation Committee to serve the entire thirty-nine (39) communities, within the Central Massachusetts region.

The former inactive Transportation Coordinating Committee will be dissolved, and the new committee will meet the requirements of the Federal Department of Transportation for comprehensive, continuing and cooperative planning. The new transportation committee to be formed will be involved in both long and short term planning for all forms of transportation.

The present contract with the Regional Planning Commission, signed in December of 1971, for the collecting of socio and economic data for an Annual Review report, will be completed by the first week in August. The Department is presently negotiating with the Regional Planning Agency for contract to hire staff to serve with the Joint Transportation Committee.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

Bureau of Transportation Planning and Development representatives have met with the Central Massachusetts Regional Planning Commission staff numerous times during the year concerning the regional planning surveillance contract and other matters.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENTEASTERN MASSACHUSETTS REGION

The one major project engaged in during the past year was the validation of the performance of the transportation planning models. This involved three contracts for services beyond the Department's capabilities. They were: one with Systematic Data Processing Services (S.D.P.S.) for computer time and supplies another with Computer Usage Development Corporation (C.U.C.) for programming services, and the last with Peat, Marwick, Mitchell, and Company (P.M.M.) for Professional Transportation Planning Services and Consulting.

The contract with P.M.M. has been substantially completed with only data transmittal and final report submission to be accomplished. The SDPS contract has been exhausted in satisfying the requirements of the P.M.M. contract for computer time. C.U.C. has accomplished their task in preparing two computer programs needed by P.M.M. to carry out the F.H.W.A. S/360 incremental capacity restraint assignment.

Future work in this study area is being deferred pending the completion of the Boston Transportation Planning Review to determine the course future effort should follow.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

NORTHERN MIDDLESEX REGION (REGION 6) COVERING LOWELL URBANIZED AREA

This area is one of four segments that once comprised the former Eastern Massachusetts Regional Planning Project (EMRPP). However, it is still tied to the total area for traffic assignment procedures. Like the other four areas, it was hoped that the past year might have seen the removal of this area from the EMRPP assignment procedure, but it has not been accomplished to date due to allocation of funds and available personnel to perform the task.

In rejuvenating the comprehensive, continuing, cooperative transportation planning process it was agreed to continue operation under the Memorandum of Understanding signed June 14, 1971. In this agreement the Transportation Coordinating Committee was established as a committee of the Northern Middlesex Area Commission.

Department personnel have attended the Area Commission's monthly meetings regularly, thereby establishing good liaison with its members.

The first annual surveillance report contract between the Commission and the Department is about to be completed. Negotiations are now in progress for a planning contract for the continuing transportation planning process.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

During the year good communications and working relationships have been developed with the Northern Middlesex Area Planning Commission.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

MERRIMACK VALLEY REGION (REGION 7) COVERING LAWRENCE-HAVERHILL  
URBANIZED AREA

This area is one of four segments comprising the former Eastern Massachusetts Regional Planning Project (EMRPP) Area; however, it is still tied to the total EMRPP area for traffic assignment procedures. It was planned to separate this area from the EMRPP assignment procedure, but it has not been accomplished to date due to allocation of funds and available personnel to perform the task of recoding the data.

Department personnel have attended the Merrimack Valley Planning Commission monthly meetings regularly, thereby establishing liaison with the participating communities.

Various highway presentations such as, the TOPICS program, the tentative Urban System, etc. have been made in the area by the Department to keep the officials and citizens informed as part of the continuing, comprehensive, cooperative transportation planning process.

Department personnel have met with local officials and members of the planning commission regarding the establishment of a continuing, comprehensive, cooperative transportation planning process. An agreement was reached and a "Memorandum of Understanding" was signed on July 26, 1972.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

The first annual surveillance report contract between the Commission and the Department is about to be completed and negotiations are now in progress for a planning contract for the continuing transportation planning process.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENTBOSTON METROPOLITAN AREA (REGION 8)

The Boston Metropolitan Area consists of 101 cities and towns in the planning area of the Metropolitan Area Planning Council (MAPC).

The Technical Advisory Committee of the Boston Metropolitan Area Transportation Study held regular monthly meetings relative to the continuing, comprehensive, cooperative planning process. The staff of the Bureau of Transportation Planning and Development reviewed 43 proposed areawide TOPICS plans and recommended Type II Networks for compatibility with the most recent Regional Transportation Plans developed for the Boston Metropolitan Area. The TAC acting as the Policy Committee then in turn endorsed the 43 proposed areawide TOPICS plans and recommended Type II Networks in Fiscal 1972.

The TAC also assisted and made recommendations to Secretary of Transportation and Construction Task Force to meet latest federal requirements relative to certification of the "3C"-planning process. Preliminary negotiations have taken place with the Metropolitan Area Planning Council to supply Socio-economic data and other related material to be used relative to the "3C" planning process and the Annual Review Report.

A considerable amount of staff time was spent in answering approximately 53 A-95 Reviews that were submitted through OPPC by various State, public and private agencies.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

BOSTON TRANSPORTATION PLANNING REVIEW

A great deal of staff time was spent in providing informational data requested by the Boston Transportation Planning Review (BTPR). In addition, full time staff from the Bureau were supplied to the BTPR to provide technical assistance in computer programing and traffic forecasting analysis.

Bureau and Department personnel attended meetings in each of the subregional areas of the BTPR.

SPECIAL SUBAREA MOBILITY STUDY

Contract negotiations were completed for a Special Subarea Mobility Study but subsequently, it was decided to be incorporated in the work program for the BTPR.

MASTER PARKING STRATEGY FOR THE BOSTON METROPOLITAN AREA

Contract negotiations for a Master Parking Strategy for the Boston Metropolitan Area were completed at the end of fiscal 1972 with work commencing in June. The parking areas consist of the CBD's of Boston, Cambridge, Salem and along the major rapid transit lines. Monitoring of the Contract is being handled by the Bureau of Project Development.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

OLD COLONY PLANNING REGION (REGION 9) COVERING BROCKTON  
URBANIZED AREA

This area is another segment of the former Eastern Massachusetts Regional Planning Project Study Area. However, it is still tied to the total area for traffic assignment procedures. Like the Merrimack Valley and Lowell Study Areas it was not possible to remove this area this year from the EMRPP assignment.

A Memorandum of Understanding relating to the comprehensive, continuing, cooperative transportation planning process in the Old Colony Planning Council Region was signed by the Secretary of Transportation and Construction, Alan Altshuler, Chairman of OCPC Donald Joyce and DPW Commissioner Bruce Campbell.

The regional planning agency is currently working on a planning contract for the preparation of the 1971 Annual Surveillance Report in the continuing transportation planning process.

Department personnel have attended the Area Planning Commission monthly meetings regularly, thereby establishing good liaison with the regional agency.

The Council has hired a new executive director this year and consequently improved communications and working relationships were achieved.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

SOUTHEASTERN MASSACHUSETTS REGION (REGION 10)

This study area consists of 30 communities, and is one of the larger study areas in the State.

In agreement with the Secretary of Transportation and Construction and the Department, the Southeastern Regional Planning and Economic Development District has been the forerunner in establishing a comprehensive, continuing and cooperative transportation planning process in Massachusetts. The various accomplishments are as follows:

a) The first regional planning agency to sign a Memorandum of Understanding relating to the 3 C Process.

b) The first regional planning agency to sign a planning contract for the continuing transportation process.

This contract was developed in order that the 3 C Process, as described in the Memorandum of Understanding be given the necessary financial support to carry out its objectives.

Both the aforementioned accomplishments have been used as a prototype in all the other regional planning areas.

c) SRPEDD is completing its existing planning contract for the preparation of the 1971 Annual Surveillance Report in the continuing transportation planning process. The scope of work involved in this contract is the development of the transportation planning process, transportation review process and data collection to monitor growth and change in the area.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

The district organization and staff of the Southeastern Massachusetts Study Area has continually expressed its enthusiasm in truly representing the people in the planning process.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

CAPE COD (REGION 11) AND DUKES COUNTY (REGION 12) PLANNING AND  
ECONOMIC DEVELOPMENT REGIONS

The Secretary of Transportation and the Commissioner of Public Works are presently negotiating with the regional planning agencies in developing a Memorandum of Understanding relative to the comprehensive, continuing and cooperative transportation planning process.

The signing of this Memorandum is expected to take place in the near future.

The District Office presently has a splendid relationship with the regional planning agencies and it is anticipated that this relationship will continue to succeed.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

TRANSPORTATION PLANNING FOR SMALL URBAN AREAS

The Origin and Destination field data collected in the North Adams-Williamstown survey has been distributed to the States of Vermont, New Hampshire and New York for their use. The O & D data was also used by this Department in studying the Route 2 and Route 7 corridors. A final report on the O & D Study has not yet been completed due to priority of other work.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

C. TRAFFIC ANALYSIS AND FORECASTING FOR PROJECTS

During Fiscal 1972, the Systems Planning and Traffic Estimating Unit received 174 requests for traffic analysis and forecasts. This fiscal time period saw the completion of 107 projects in the following categories:

Route Analysis

Route 3 Tyngsborough  
 Route 52 West Boylston-Sterling  
 Route 128 Burlington-Woburn  
 Route 111 and I-495 Boxboro  
 Route 5 Holyoke-West Springfield  
 Relocation Route 146 Uxbridge  
 Relocation Route 2 Acton-Lexington  
 Route 128 and Route 3 Connector Burlington-Lexington  
 Relocation Route 2 Greenfield-Gill  
 Route 2A Shirley-Lunenburg  
 Route I-93 and Dascombe Road Interchange - Andover  
 Relocation Route 2 Acton-Lexington (Revised)  
 Route 9 and Route 135 Interchange - Westboro  
 Relocation Route 2 and Route 7 - Williamstown  
 Relocation Route 10 Southwick-Westfield - Easterly Alignment  
 Route 9 and Route 20 Interchange - Northboro  
 Route 9 and Route 30 Interchange - Westboro  
 Route 9 and Route 85 Interchange - Southboro  
 Route 10 Relocation - Southampton  
 Route I-93 and Mystic Valley Parkway - Medford Conn.  
 Route 9 and Route 140 Interchange - Shrewsbury  
 Connector Route 128 (Blackburn Circle to Route 127 Gloucester-Rockport)  
 Route 2 Relocation Greenfield-Gill  
 Route 52 No Improvement Assignment, Worcester-Leominster  
 Connector-Route 24 and Route 138 Dighton-Berkley  
 Route 52 For Westerly Alignment - Worcester-Leominster  
 Route 2 and Nine Acres Road Intersection - Concord  
 Route 97 and Route 35 Topsfield-Wenham-Danvers  
 Route 25 - Mansfield-Bridgewater (No Build)  
 Route 1A Beverly-Salem Bridge



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Environmental Impact Studies

Route 140 Franklin  
Route 20 Russell  
Route 28 and Route 25 Bourne  
Route 213 Lowell  
Route 23 Monterey  
Route 10 Southampton  
Route 52 Worcester-Leominster

TOPICS Projects

Melrose (Sylvan, Franklin and Green Streets at Main Street)  
Framingham (Central, Water, Elm, Danforth and Concord Streets)Lo  
Lowell (Chelmsford Street)  
Brookline (Beacon Street - Washington Street)  
Quincy (Upland Road)  
Braintree (Washington Street - Franklin Street)  
Methuen (East Street - Arlington Street)  
Weymouth (Bridge Street - Neck Street)  
Springfield (Dwight Street - Chestnut Street)  
Boston (Congress Street)  
Peabody (Lowell Street)  
Springfield (Winchester Square)  
Springfield (Wilbraham Street)  
Springfield (Locust, Mill and Belmont Streets)  
Springfield (State and Berkshire Streets)  
Lynn (Route 1A)  
Peabody (Wilson Square)  
Waltham (Maple, High and Moody Streets)  
Waltham (Main, Warren Gove Streets and Barbara Road)  
Waltham (Trapelo and Waverly Oaks Road)  
Barnstable (Route 132)  
Swampscott (Bradlee Aveneu)  
Swampscott (Walker Road)  
Swampscott (Essex Street)  
Swampscott Atlantic Avenue)  
Boston (Commonwealth Avenue)  
Wakefield (Main Street)  
Needham (Great Plain Avenue)  
Needham (May Street)  
Waltham (Lexington Street)  
Quincy (Granite and Whitwell Streets)  
Quincy (Granite Street and Upland Road)  
Quincy (Upland Road and Saville Street)  
Quincy (Adams, Bridge Streets, Newport Avenue and Upland Road)  
Quincy (Furnace Brook Parkway and Newport Avenue)



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Quincy (Beale Street and Newport Avenue)  
Quincy (Beale Street and Old Colony Avenue)  
Quincy (Beale Street and Greenwood Avenue)  
Taunton (Dean and Arlington Streets)  
Taunton (Broadway and Purchase Street)  
Taunton (Summer, Spring and Church Streets)  
Taunton (Winthrop and Highland Streets)  
Winchester (Mystic Valley Parkway and Main Street)  
Winchester (Mystic Valley Parkway and Highland Avenue)  
Winchester (Skillings and Shore Roads)  
Winchester (Skillings Road, Main and Palmer Streets)  
Lynn (Broadway, Boston and Chestnut Streets)  
Lynn (Broadway and Euclid Avenue)  
Taunton (Tremont and Granite Streets)  
Weymouth (Main Street - Route 18)  
Boston (Beacon, Newbury, Boylston Streets, Commonwealth and  
Massachusetts Avenues)  
Boston (St. Botolph Street, Huntington and Massachusetts Avenues)  
Boston (Tremont Street, Columbus and Massachusetts Avenues)  
Boston (Washington Street, Shawmut and Massachusetts Avenues)  
Boston (Albany Street, Harrison and Massachusetts Avenues)  
Dedham (Bridge, Pine and Ames Streets)  
Dedham (High, East, Harvard and Williams Streets)

Safety Projects

Route 24 Canton-Fall River  
Route 140 West Boylston  
Lighting - Relocation Route 7 - Lanesborough-Lenox

Area Projects

Clinton Street Ramp - Central Artery, Boston  
Eastern Avenue - Fall River

Pavement Overlay Projects

Route 128 Wellesley-Burlington  
Eastern Avenue - Chelsea  
Route I-91 Longmeadow-Springfield  
Mystic Avenue Medford-Somerville  
Route I-495 Westboro-Littleton  
Route I-495 Littleton-Chelmsford  
Route I-495 Chelmsford-Lowell  
Route I-495 Lowell-Andover





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

D. OTHER MODES

STATEWIDE AIRPORT SYSTEM STUDY

Massachusetts became the first state in the country to initiate an Airport System Study under funding provided by the 1970 Airport and Airways Act of Congress.

This year, the Bureau of Transportation Planning and Development, in cooperation with the Massachusetts Aeronautics Commission, and with A. D. Little as consultant, has prepared a Preliminary Plan for the role of 39 airports in the state general aviation system.

The Bureau has contributed the land use inventory, the layout maps and the structural and capacity analysis of highway facilities serving these airports. Others have evaluated the navigational, safety and operational capacity resources of the system. At this stage of the study, preliminary recommendations are emerging and a series of public meetings in the Regional Planning Process are scheduled to inform, and listen to local and regional citizens on this program.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENTLOGAN AIRPORT TRAVEL STUDY

This project was completed during the year. The report will be printed and ready for distribution shortly.

Analyses of the following airport activities were produced:

1. Mode of travel to and from the airport by volume, by air travellers, visitors, employees.
2. Profile of air travellers, by residence, income level and purpose
3. Cordon counts and classification of vehicles entering and leaving the airport
4. Attitudes of transit users and service desires
5. Cargo tonnages, local cargo ground volumes, origins & destinations and air distance of cargo
6. Air trip generation by town, by sector and by ring in the Logan market
7. Correlation of air traveller baggage use with ground trip made
8. Air trip distances and volumes

The report contains detailed field inventory and gives quantitative data on these and other analyses. The principal objectives of the study were to obtain the Logan International Airport travel information and record it on the magnetic tape files which have been distributed to the following Inter-Agency Technical Committee members:



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Mass. Bay Transportation Authority

Mass. Department of Public Works

Mass. Port Authority

Mass. Turnpike Authority

City of Boston

Various elements of the report data have been used in the research activities of D.O.T. Cambridge, D.O.T. Washington, The Boston Transportation Planning Review, the Statewide Airport System Study and some airlines.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENTEMPLOYEE COMMUTER STUDIES.

Efforts to reduce peak hour congestion generally and parking demand specifically at 100 Nashua Street may result in the findings of an origin-destination and attitude survey of 900 plus DPW employees and 700 plus Registry of Motor Vehicles employees based in the North Station area.

Findings show that employee parking demand is almost double the capacity of parking space, and that employees are receptive to other modes such as express buses from outlying stations, car parking and shifting to transit under certain conditions. Starting hour of work and even 4-day work week were listed by employees as means of reducing travel congestion. Comparisons with a similar study during 1970 indicate a very slight but identifiable shift to transit use by Department and Registry employees.

The Bureau has also begun the investigation of our own feeder service from the Riverside Line MBTA to the Wellesley Maintenance Depot for employees who have no cars or cannot participate in car pools. The fact that an employee at Wellesley Depot must commute by car is a limiting condition to such employment. Preliminary estimates of cost of such service have been made to establish feasibility of experimental service. This program will be followed up.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENTE. MASS TRANSIT RELATEDEFFECT OF MBTA SOUTH SHORE EXTENSION ON SOUTHEAST CORRIDOR  
TRAVEL PATTERNS1972 Summary

The following preliminary findings were developed in 1972:

- (1) Auto traffic is still predominant in the corridor
- (2) Local transit use has increased resulting in slightly lower vehicle through travel on local streets
- (3) Some park and ride demand has shifted from Mattapan-Milton-Ashmont boarding points to Quincy boarding points
- (4) No significant change in automobile occupancy has occurred.

The South Shore Rapid Transit extension is a 6.25 mile facility which diverges from the Harvard-Ashmont (Red) line at Andrew Square and runs to Quincy Center via stops at North Quincy and Wollaston.

The extension commenced operations in September of 1971. In anticipation of the transit service penetration deeper into the corridor, vehicular traffic at 50 locations south of the Neponset River was monitored in November and December of 1970. These stations provided a multiple screenline (or cross-sectional) interception of traffic North and South of the 3 new transit stations in Quincy. In addition, selected counting locations provided a cordon surrounding the transit stations. All counting locations were repeated in November and



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

December of 1971. The before and after counts were analyzed and compared on the basis of peak hour volumes, 24 hour volumes and passenger occupancy per auto for each year. A report has been distributed with these results.

An important part of this investigation remains to be done. The time series trend of revenue passengers on the 3 Quincy stations compared to the trend of revenue passengers on the Ashmont to Andrew stations of the Red Line (1970 to 1971) may reveal more detail concerning the regional demand of the transit extension.

Another aspect of the transit trend should be visible by the difference in feeder operations to Ashmont vs. the same operations to Quincy Center as a part of the "Before and After" profile.

Coordination with MAPC and MBTA is continuing towards the land use and transit phases of this report for 1973.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENTF. INFORMATION SYSTEMS, MODELING AND ANALYSISINFORMATION SYSTEMS

Recently, at the direction of the Commissioner of Public Works a two-man Task Force was formed to pursue the aims set forth by the Committee on Consolidated Information Systems in their Report Number 1 entitled "Preliminary Survey and Recommendations." In response to this request the Task Force has issued two additional reports; one dealing with Computer Model Evaluation Criteria in the face of E P A Water Pollution Control Pilot Project, which will involve input from the DPW under the "3C's" process; and the other dealing more directly with "in-house" considerations in addressing the question of file interface and format adjustment to meet Department Management Information Requirements.

After file review and analysis procedures the Task Force has recommended that we adopt the Road Inventory File, developed by the BTP&D as our base file for some of the following reasons:

1. This file identifies every passable roadway link with a seven digit code. The first three numbers identify the city or town, and the last four numbers identify the link within that city or town.
2. This Inventory Information System is currently operational with file edit, maintenance and reporting capabilities.
3. The Inventory System Design was developed "in-house" by the Statewide Highway Transportation and Data Processing Section, giving first hand control for future expansion, manipulation and maintenance.



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The Task Force has decided to proceed with a demonstration project, using this base file to tie together currently unrelated files I.C. the Federal Census Dimes File, the Maintenance Inventory and Cost Accounting Files and the Traffic Accident File. The Towns of Agawam and Longmeadow have been tentatively chosen for this pilot project.

UNITED STATES CENSUS 1970 DATA

The major effort has been to work toward obtaining the data from the 1970 Census on traffic zones and the census tracks and block has been almost completed. A few details on the area covered and the zonal breakdown need to be cleared up with the Census Bureau. Recently a statewide town to town trip matrix was added to the list of products available from under this special tabulation program.

On the use of the data considerable questions remain, which can only be answered through using the data here in Massachusetts and other states. How do we work with data covering only work trips? How will the individual answers on predominant mode of transportation differ from that in previous O & D survey methodology? Potentially the data has considerable possibilities for replacing much of the expensive O & D surveys.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

STATEWIDE TRAFFIC ASSIGNMENTS

The major work on the statewide assignments awaits the updating of the travel forecasts in each of the urban study areas as a basis for making travel forecasts for the entire state. In addition a town to town work trip table for 1970 will be forthcoming from the Census. The highway networks will be developed utilizing the statewide road inventory now being carried out. Therefore, there has not been much progress toward making the statewide assignment this fiscal year.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENTG. RESEARCH AND SPECIAL STUDIESECONOMIC IMPACT STUDY - ROUTES I-91 AND I-291 SPRINGFIELD

A contract was signed with Worcester Polytechnic Institute as consultant for a study to assess the social, environmental, physical and economic benefits and/or detriments to an urban community in the impact area of an expressway after construction of a facility.

Actual work on the contract began April 1, 1972, with the initial progress meeting held May 25, 1972. The Technical-Policy Advisory committee is still to be formed. That committee will include membership from among the Federal Highway Administration, Massachusetts Department of Public Works, the City of Springfield, the Lower Pioneer Valley Regional Planning Commission, the Springfield Chamber of Commerce, the Springfield press and other communications media.

This committee will function in an advisory capacity in the establishment of overall policy for the study, to review and evaluate methodology, to review and evaluate progressive findings, to disseminate information and develop public relations, and to act in any other appropriate capacity to enhance the value of the work.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

ECONOMIC GROWTH CENTERS

Section 127 of the Federal Aid Highway Act of 1970 amended Chapter 1 of Title 23, United States Code, by adding thereto a new section, entitled "Economic Growth Center Development Highways", which authorizes the Federal Secretary of Transportation to make grants to states for demonstration projects for the construction "... of development highways on the Federal-Aid Primary System..."

The objectives of the law, as stated in the Act, were "to demonstrate the role that highways can play to promote the desirable development of the Nation's natural resources, to revitalize and diversify the economy of rural areas and smaller communities, to enhance and disperse industrial growth, to encourage more balanced population patterns, to check, and, where possible, to reverse current migratory trends from rural areas and smaller communities and to improve living conditions and the quality of the environment..."

Upon invitation of Secretary Volpe on July 30, 1971, the Governors of all states were invited to submit recommendations of not more than three Economic Growth Centers which they believed met criteria developed at the Federal level. Responsibility for the preparation of the Massachusetts report fell to the Statewide Highway Transportation Section.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENTGOODS MOVEMENT - FOR-HIRE TRUCK FREIGHT STUDY

A final report was prepared in 1972. The area of investigation covered the role of For-Hire trucks in goods movement in Massachusetts. The study compiled and distributed a Directory of For-Hire Truck Operators which was used by the Massachusetts Department of Commerce and Development in their industrial and manufacturing development programs.

In addition, characteristics of specialized truck services such as petroleum transport, port haulage and tonnage, construction materials truck hauling and movements were quantified and evaluated.

Comparisons were developed with findings and results of other investigations such as Truck Weight Studies and ICC revenue freight statistics.

The report was transmitted to the Boston Transportation Planning Review for their use in analyzing truck routes and needs required in their program. The BTPR acknowledged the contribution of this study to their proposals.





BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

NATIONWIDE TRUCK COMMODITY FLOW STUDY

As a continuation of Goods Movement research, the Bureau of Transportation Planning and Development has undertaken to assist the Federal Highway Administration in a Nationwide Truck Commity Flow Study.

In May, 1972, the Bureau initiated a search of Registry of Motor Vehicles truck registrations to select a predetermined sample of trucks to answer a comprehensive questionnaire on truck movements, weights, cargoes and trips for a specific 24-hour period.

This program will select approximately 1000 truck units each month for the next 12 months and forward the data to FHWA for analysis on a nationwide basis.

To date, response from truck owners has been satisfactory.



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H. MISCELLANEOUS

INTERSTATE TRANSPORTATION COORDINATING COMMITTEES

The two Tri-State Transportation Committees formally established by Memoranda of Understanding with adjacent state highway departments in 1965 met this year for their seventh annual meeting to discuss mutual problems, exchange of planning data and to coordinate planning of transportation facilities crossing state boundaries or having interstate implications.

Connecticut was the host for the meeting of the Committee comprising Rhode Island, Connecticut and Massachusetts.

The other meeting was held at Northfield, Massachusetts for the Committee comprising the states of New Hampshire, Vermont and Massachusetts with Massachusetts as the host.



BUREAU OF TRANSPORTATION PLANNING AND DEVELOPMENT

IN-HOUSE TRAINING COURSE

During the year eight transportation planning engineers have been appointed in each of the districts of the Department of Public Works. Also, there has been the assignment of engineers with little transportation planning experience to planning and liaison work for the urbanized areas and with the regional planning agencies. This pointed to a definite need for an in-house training course.

Monthly sessions have been held starting in January of 1972 for general orientation concerning the transportation planning process. It is anticipated that as time goes on a more technical approach in the training will be achieved. It is proposed that a number of the personnel can be sent to the FHWA Urban Transportation School in Washington, D.C. or possibly that the course could be conducted in Massachusetts.



G





BUREAU OF SOLID WASTE DISPOSAL

The Bureau of Solid Waste Disposal within the Department was created by Chapter 834, Acts of 1969. The law became effective on November 26, 1969 and the Commissioner was directed to establish the Bureau to carry out its provisions.

Solid waste, a rather new name for all non-liquid wastes, has been a problem since the days of the cavemen. Today, affluent society is creating mountains of it. To solve the problem is to understand the generation of waste - the amount and types; the collection; transfer and ultimate disposal. The existing problems must be understood and solutions must be found. Chapter 834, directed that the Bureau "shall investigate and study the solid waste disposal needs of the Commonwealth and after public hearing, shall develop and submit to the appropriate regional planning agencies for their review and comment, proposed programs for solid waste disposal including plans for their implementation."

With the enactment of air pollution standards, many dump and incinerator operations were violating the law and with the introduction of a new sanitary landfill code nearly all disposal operations were illegal. A serious problem now had been compounded.



Chapter 834 of the Acts of 1969 states that actions proposed by the Bureau must be concurred in by the Departments of Public Health and Natural Resources. To clarify this arrangement, a memo of understanding was prepared and signed by the three agencies which delineated their respective responsibilities. Public Works was named the operating agency which would plan, design, construct and operate solid waste disposal facilities; and Public Health was named a regulatory agency which would approve assignment of sites and all design and operating procedures; and Natural Resources was named a regulatory agency which would also approve the assignment of sites.

After the agreement was signed, the Governor designated the Department of Public Works as the sole agency to receive and disburse federal funds for solid waste activities and to coordinate state-wide activities for solid waste management.

Application was made to the Federal Health, Education and Welfare Department for their participation in a state-wide study. Approval was received and \$134,000.00 was made available as matching funds for this purpose. The new Federal Environmental Protection Agency administered this activity and a proposal has been made for further federal participation in eligible projects, including solid waste resources recovery.

The joint Federal-State study commenced in February 1971 and was completed by the Raytheon Service Company in June 1972. It inventoried sources of solid wastes and identified collection, transfer and disposal methods and practices in the Commonwealth. Also, through the systems



BUREAU OF SOLID WASTE DISPOSAL

Analysis approach, the study identified future needs for coping with increased amounts of waste and finally recommended the means and methods by which a statewide solid waste master management plan might be developed.

Knowing that immediate action was needed and that it should not wait for the statewide program plan, the Bureau proposed to engage the services of consultant engineering firms to plan and design facilities for short-term solutions for solid waste disposal in critical areas of the state which had shown an interest in regional facilities. Approval was granted to hire consultant firms for the Greater Springfield and Greater Worcester Areas. Contracts were awarded to C. E. Maguire, Inc. in December 1971. Results of these studies are due in August of 1972.

The most pressing problem in regional solid waste disposal is site location and acceptability by the populace. The Bureau has found that the average person is very interested in the proper disposal of solid waste as long as the site is not in his municipality. The Bureau staff has been investigating sites for sanitary landfill operations throughout the state. Many have been investigated, only to find that public opinion will result in a denial of its use.

During the past year, the Bureau has sponsored seminars on solid waste management, conducted regional informational meetings, prepared articles and speeches on solid waste, and cooperated with all other agencies and local officials in endeavors to aid and solve as many problems as possible.



Full support was given to the Federal "Mission 5000" program which is a public education endeavor to eliminate 5000 dumps across the country.

Past endeavors by the Bureau have demonstrated that its future efforts to promote and develop sound and viable solid waste management will be most difficult unless changes are made in Chapter 834. If the law is amended to give the Bureau the right to prescribe regional districts and assign municipalities to them and to provide grants for research and demonstration projects in the fields of resource recovery, reclamation and recycling, it is expected that the future progress of the Bureau will be more dramatic and productive.

The Bureau has been charged with a most difficult mission - to investigate and record present statewide conditions concerning the amount, types and principal sources of solid wastes and the methods of collecting, transporting, processing and disposal of such wastes; the needs of the Commonwealth for handling the ever increasing volume of solid waste on both a short and long term basis and the development of a statewide solid waste management master plan.

The survey of existing conditions and a forecast of future needs have been made. The Bureau and the Departments of Public Health and Natural Resources, together with the recently established Council on Solid Waste and the Office of Environmental Protection, within the Water Resources Commission, are now in the process of developing a





BUREAU OF SOLID WASTE DISPOSAL

recommended master plan. The regional planning agencies are being requested to work as partners with the Bureau in developing such a plan and in informing and promoting the understanding and assistance of public and private officials and citizens which are necessary for the solution of this stubborn problem.

The Bureau will need more manpower, money, and the cooperation of all agencies and people if it is to expedite and win the battle for the protection of the environment.



H



## LEGISLATION

### 1972 - RECOMMENDATIONS

1. AN ACT PROVIDING FOR DRIVING A VEHICLE DURING INCLEMENT WEATHER CONDITIONS.

At the present time, Massachusetts Laws do not contain sufficient requirements governing the operation of vehicles on our arterial highway system during inclement weather conditions. This bill would provide for the official declaration of a weather emergency period after local request and would require special traction precautions during such period.

2. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ESTABLISH SPEED ZONING ON ALL NUMBERED ROUTES.

Since 1948 the department and municipalities have been authorized to establish speed zones on ways under their respective controls. For some time now, breaks in State Highways on numbered routes have been indicated as confusing to vehicle operators and more particularly so where the breaks have not been speed zoned by local officials. This authorization for the department to speed zone all numbered routes will not only be helpful to the motorists but will provide for continuity as well as uniformity in controls along our numbered route system.

3. AN ACT CLARIFYING THE PROVISIONS FOR ASSISTANCE TO CITIES AND TOWNS TO ELIMINATE ACCIDENTS AT HIGH-ACCIDENT LOCATIONS.

Chapter 519 of the Acts of 1967 inserted in Chapter 90 of the General Laws a new section which provided 75% state assistance to cities and towns in eliminating high-accident locations through the installation of suitable traffic control devices. This proposal revises the original Act by requiring the state to pay 100% of the cost.



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4. AN ACT PROVIDING FOR THE ESTABLISHING OF TRAFFIC COMMISSIONS.

This proposal will create a general enabling act which after local acceptance establishes a local traffic commission which will assume all traffic regulatory powers presently vested in city councils or boards of selectmen.

5. AN ACT CHANGING THE TITLE OF THE BUREAU OF SOLID WASTE DISPOSAL.

The purpose of this bill is to change the title of the Bureau of Solid Waste Disposal to better describe the functions of said bureau.

6. AN ACT RELATIVE TO PUBLIC INFORMATION CENTERS AT SAFETY REST AREAS.

The purpose of this bill is to authorize the Department to establish information centers at certain rest areas along state highways by entering into lease agreements providing for their construction, operation and maintenance. Information centers are planned for major highways entering the state and at certain internal locations important to tourism. This authorization will provide for the elimination of the cost of establishing information centers and reduce the cost of maintaining sanitary facilities.

7. AN ACT PROVIDING FOR WARNING DEVICES ON DUMP BODY TRUCKS.

The department is presently experiencing incident of damage to overhead highway signs by the accidental raising of a dump body without the knowledge of the truck operator. Such an accident besides causing extensive damage to highway sign structures, also presents extremely hazardous operational conditions to the





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7. (Cont'd)

traveling public when in the vicinity of the occurrence of such an accident. This bill would require periodic inspection of the proper operation of a warning light or device to notify the operator of a lifted dump body. The provisions of this bill would not become effective until just prior to the 1972 fall inspection.

8. AN ACT REQUIRING SECURE COVERAGE AND ENCLOSURE OF CERTAIN LOADS WHILE TRAVERSING THE WAYS OF THE COMMONWEALTH.

This bill would add to the present law which prohibits dropping or leaking loads, the further requirement that..."when said load consists of material that is loose or can become unbound"... it shall be ..."fully, adequately, and securely covered and enclosed. The bill also rewrites the second sentence which provides for dropping sand, water or other substances on the highway for maintenance purposes.

9. AN ACT INCREASING THE PENALTY FOR DISPOSAL OF GARBAGE OR REFUSE IN CONTAINERS ALONG HIGHWAYS, AND IN REST AREAS.

This bill provides for increasing the penalty for disposal of household or Commercial garbage or refuse in a container along the highway or in a rest area from \$50.00 to \$200.00.

LAND TAKINGS

10. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ACQUIRE CERTAIN OTHER PUBLIC LANDS FOR HIGHWAY PURPOSES. (NATICK ROUTE 135)

11. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ACQUIRE CERTAIN OTHER PUBLIC LANDS FOR HIGHWAY PURPOSES. (SAUGUS ROUTE 129)



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LAND TAKINGS (Cont'd)

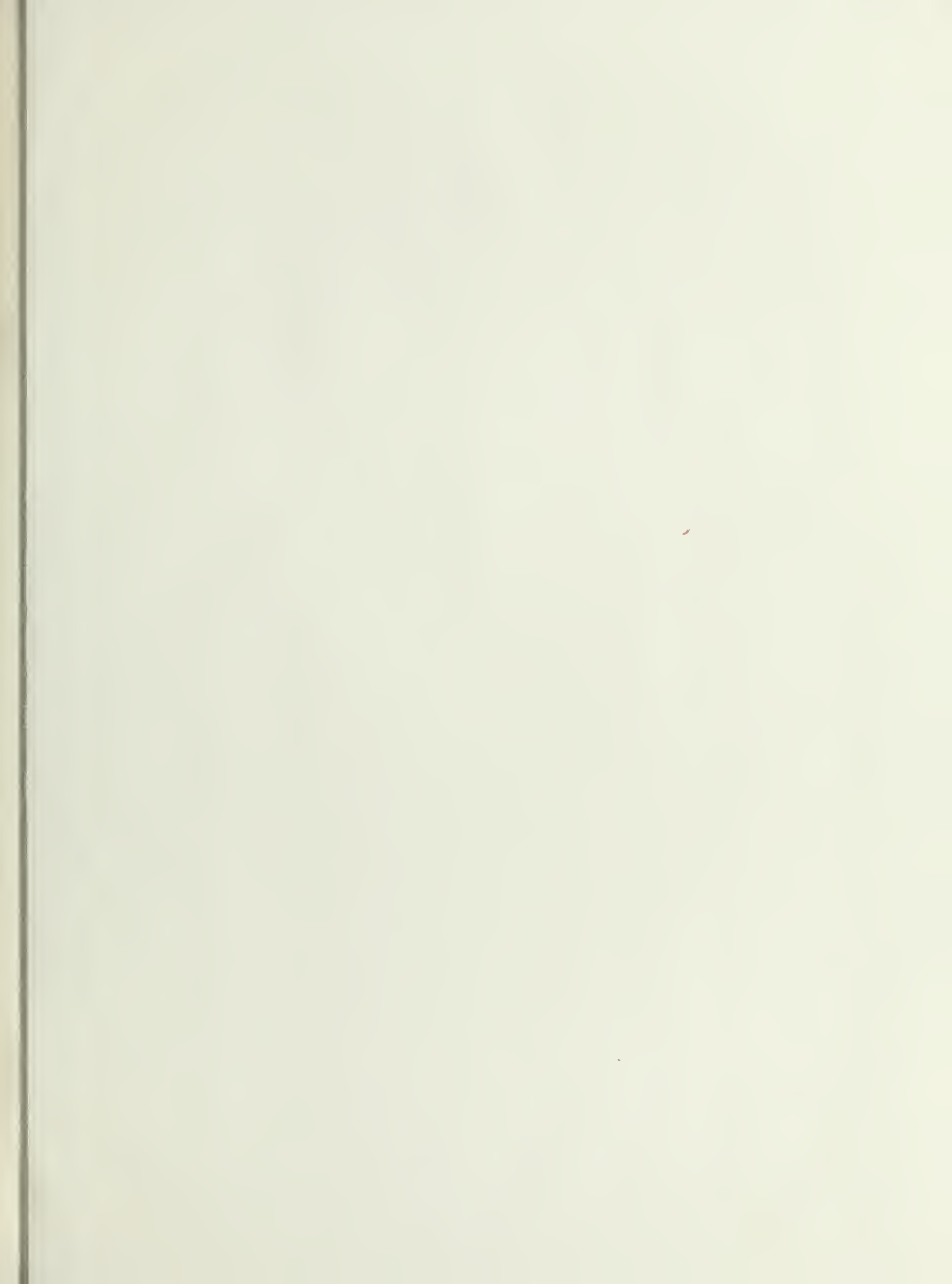
12. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ACQUIRE CERTAIN OTHER PUBLIC LANDS FOR HIGHWAY PURPOSES. (DIGHTON ROUTE 138)
13. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ACQUIRE CERTAIN OTHER PUBLIC LANDS FOR HIGHWAY PURPOSES. (MARLBOROUGH ROUTE 85)
14. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ACQUIRE CERTAIN OTHER PUBLIC LANDS FOR HIGHWAY PURPOSES. (NEW BEDFORD ROUTE 18 - CITY CONNECTOR)
15. AN ACT AUTHORIZING THE DEPARTMENT OF PUBLIC WORKS TO ACQUIRE CERTAIN OTHER PUBLIC LANDS FOR HIGHWAY PURPOSES. (FAIRHAVEN ROUTE 6)

The above six Bills authorize the departments taking of other dedicated lands for highway purposes.











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